MINING WORLD

in this issue

ASARCO's Star Shaft

Page 26

EIMCO Crawler Rockershovels – are dependable and efficient for all trackless mining applications. Their heavy-duty construction provides long-life and low-cost.

EIMCO

THE EIMCO CORPORATION

The World's Largest Manufacturers of Underground Rock Loading Machines

EXECUTIVE OFFICES AND FACTORIES - SALT LAKE CITY 10, UTAH, U.S.A.

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NEW YORK, 51-52 SOUTH STREET • CHICAGO, 3319 SOUTH WALLACE STREET
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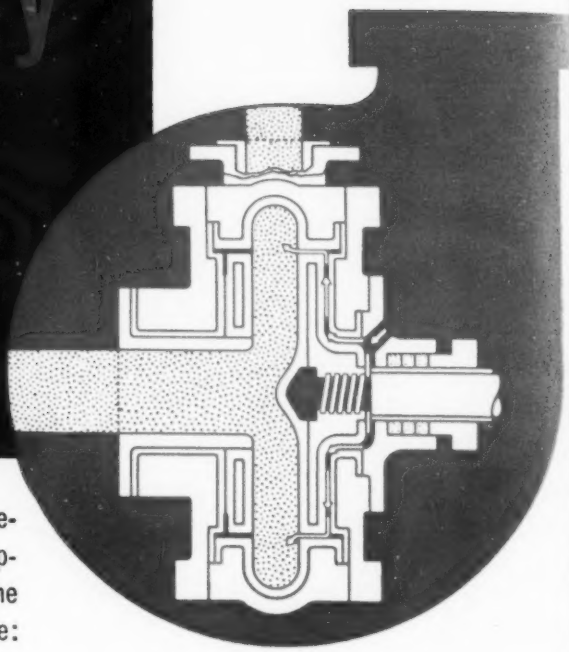
IN FRANCE, SOCIETE EIMCO, PARIS, FRANCE
IN ENGLAND, EIMCO (GREAT BRITAIN) LTD., LEEDS 12, ENGLAND
AGENTS IN ALL PRINCIPAL CITIES THROUGHOUT THE WORLD

JANUARY 1952

Vol. 14 No. 1

35 cents a copy
In Sterling, 3s

The Inside Story OF PUMP ECONOMY



Million-ton-plus performance on harsh abrasives, with no appreciable loss in efficiency, capacity, or head . . . low power consumption . . . simple, inexpensive maintenance. Here are some of the design features of Hydroseals that make these results possible:

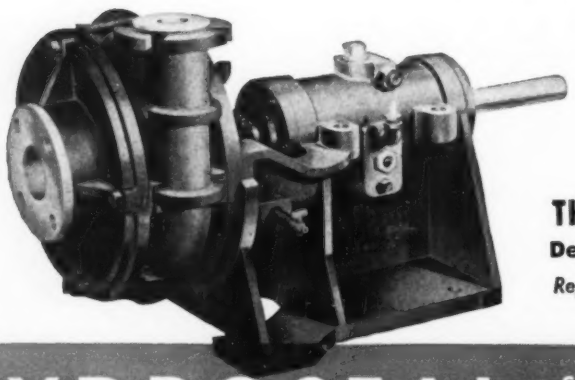
High Efficiency—Clear sealing water protects close clearances from abrasive wear. Initial high efficiencies are thus maintained throughout pump life. No adjustments, take-up, speed changes, etc., are necessary.

Power Savings—Maintained efficiency means that you don't need to install an oversize pump and motor in order to allow for wear. Power costs are reduced as much as ⅓ to ½.

Long Life—Abrasives bounce off the super-tough Maximix Rubber Parts, which outlast metal 4 to 6 times or more. Special alloys are used for coarse material service. Heavy-duty, anti-friction radial and thrust bearings are standard.

Easy Maintenance—All Maximix Rubber Parts are moulded to shape and are mechanically locked into correct position . . . no cementing or vulcanizing is needed. Your own men can make any repairs quickly in the field.

Low Cost Replacements—Besides being low in cost, Maximix Rubber Parts weigh 80% less than equivalent metal parts . . . easy to handle, inexpensive to ship.



Compare these advantages with those of any other abrasives-handling pumps, and you'll see why so many milling engineers like to have Hydroseals working for them. Write for Catalog No. 451.

THE ALLEN-SHERMAN-HOFF PUMP CO.
Dept. J—259 E. Lancaster Ave., Wynnewood, Pa.
Representatives in Most Principal Cities

HYDROSEAL

SAND, SLURRY & DREDGE PUMPS
MAXIMIX RUBBER PROTECTED

HYDROSEAL PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD

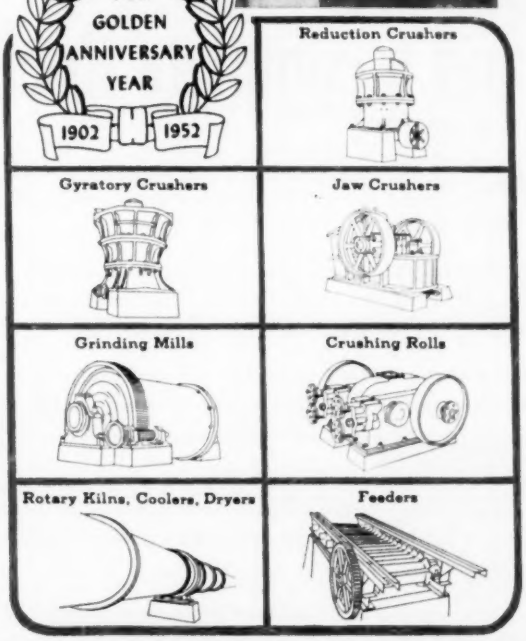
no more cars . . .

That was the problem faced 35 years ago by informed men in the automotive industry. They thought they could never produce over 900,000 cars per year. But today, car production runs in the millions.

The Traylor Type S Jaw Crusher features non-chokable smooth-faced curved jaw plates, which allow for greater capacity at finer setting and longer life of wearing plates. Seven sizes. For complete details, ask for Traylor Bulletin 125.

Fifteen years *before* this crisis in the automotive business, Traylor was busily developing better equipment to increase ore production. For 50 years, Traylor has worked to extend its lead in building the equipment needed by the mining industries. Modern mining depends on the constant improvement of machinery to maintain peak operating efficiency. With half a century of experience, Traylor stands ready to meet this need.

OUR GOLDEN ANNIVERSARY YEAR
1902 1952



Traylor

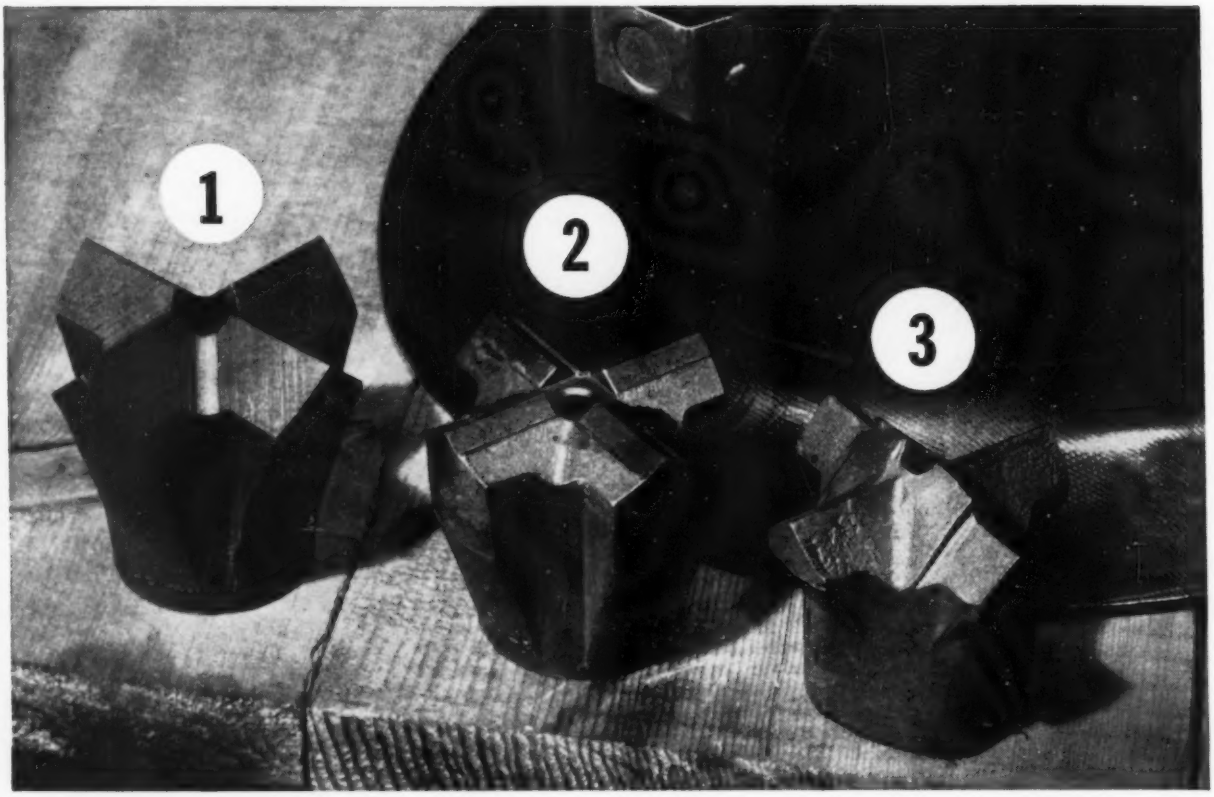
ENGINEERING & MANUFACTURING CO.

423 MILL ST., ALLENTOWN, PA.

Sales Offices: New York • Chicago • Los Angeles
Canadian Mfrs: Canadian Vickers, Ltd., Montreal, P. Q.

A TRAYLOR LEADS TO GREATER PROFITS

Only the Timken Company offers all 3 rock bit types



and a complete Rock Bit Engineering Service!

FOR the best rock bit type for your job, go to the Timken Company. Only the Timken Company makes *all three* rock bit types:

1 MULTI-USE. Gives lowest cost per foot of hole when full increments of drill steel can be drilled and when control and reconditioning of bits are correct.

2 CARBIDE INSERT. For drilling extremely hard and abrasive ground, small holes, extra deep holes. Holes go down faster, bit reconditioning is simplified.

3 ONE-USE "SPIRALOCK". For use where reconditioning is not feasible. Gives lowest unit cost of the three types. "Spiralock" union holds bit on dependably, permits easy removal.

And because the Timken Company makes all three types, only the Timken Company offers you a *complete* Rock Bit Engineering Service. Backed by 20 years' experience in solving rock bit problems, our rock bit engineers will give you an unbiased recommendation of the one bit to meet your drilling needs; whether you're looking for lowest bit cost, lowest cost per foot drilled, greatest possible drilling speed, or any other desired advantage.

FREE BOOKLET! Shows full line of bits with detailed descriptions, plus other useful rock bit data. Write The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".

... your best bet for the best bit ... for every job

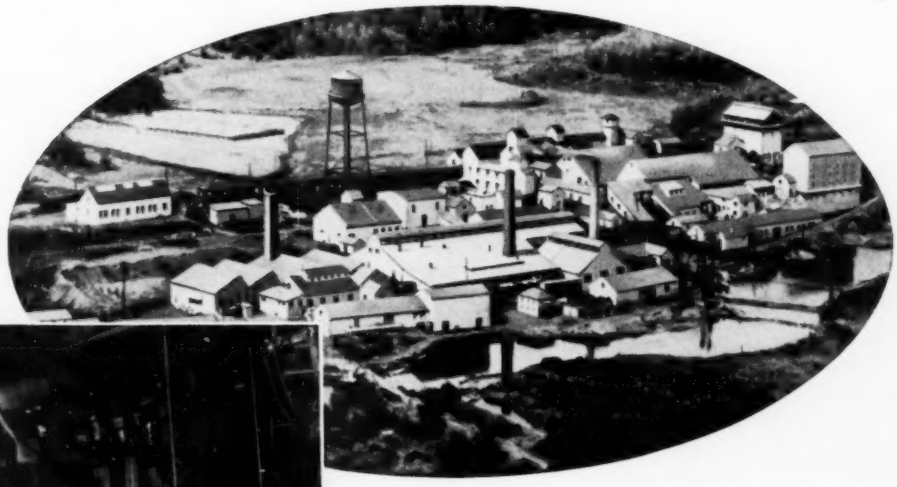
TIMKEN

TRADE-MARK REG. U.S. PAT. OFF.

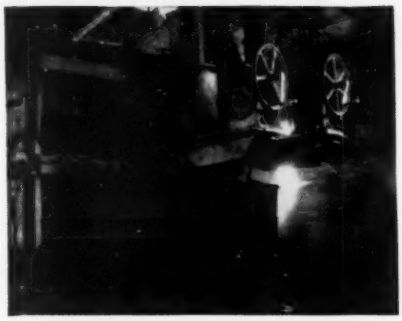
MINING WORLD, January, 1952. Volume 14 No. 1. Published monthly, except April when publication is semi-monthly, at Emmett St., Bristol, Conn. Executive, advertising and editorial offices, 121 Second St., San Francisco 5, California. Subscription in United States, North, Central and South America, $3.00 per year; other countries, $4.00 per year. Entered as second class matter Oct. 10, 1951 at the Post Office at Bristol, Conn., under the act of March 3, 1879. Postmaster: please send notice 3579 to MINING WORLD, 71 Columbia St., Seattle 4, Washington.

TAKE *Lectromelt* FURNACES TO YOUR ORE AND SAVE ON TRANSPORTATION

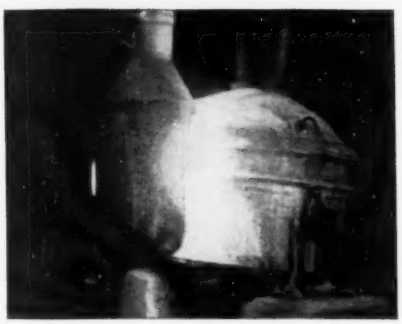
Deloro Smelting & Refining Company, Ltd., employ three Lectromelt Furnaces here at Deloro, Ontario.



• This 150 kva. Lectromelt Furnace is smelting cobaltconcentrates. Total charge 6-7 tons per day.



Silver concentrates are treated by this 100 kva. furnace at the rate of 3½ to 4 tons of charge per day.



Cobalt alloys are melted and refined in this 250-pound lectromelt furnace. Another similar furnace is being added.

You have electric power at the mine site. Why not locate Lectromelt* smelting furnaces there and avoid long, expensive hauls of bulky ores? You'll doubtless be money ahead.

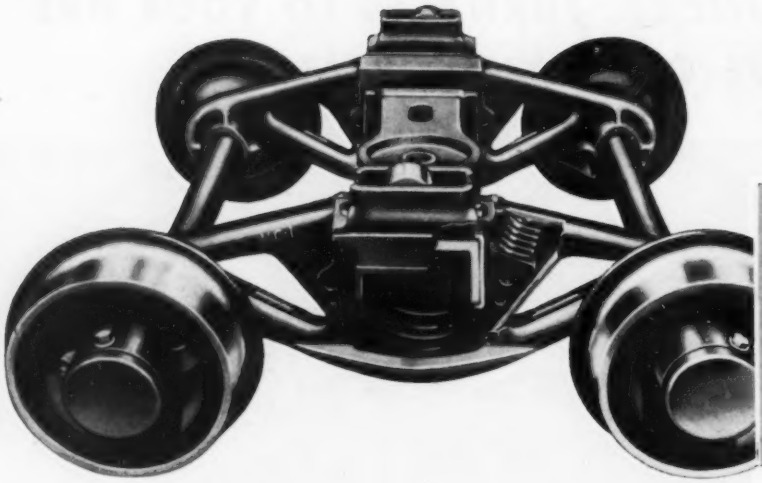
Lectromelt Furnace equipment is dependable and long lived, so it can safely be installed away from service centers.

Our engineers are familiar with the use of electric arc furnaces for smelting, refining and melting operations. They can help you select the Lectromelt equipment you need and will advise on the designing of your furnaces. For Bulletin 104 telling you more about these furnaces and services, write Pittsburgh Lectromelt Furnace Corporation, 324 32nd Street, Pittsburgh 30, Pennsylvania.

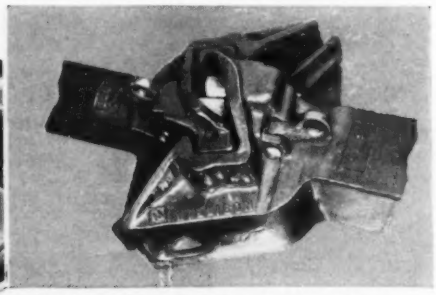
Manufactured in . . . CANADA: Lectromelt Furnaces of Canada, Ltd., Toronto 2 . . . ENGLAND: Birlec, Ltd., Birmingham . . . AUSTRALIA: Birlec, Ltd., Sydney . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bresseux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa.

*REG. T. M. U. S. PAT. OFF.

WHEN YOU MELT... MOORE RAPID *Lectromelt*



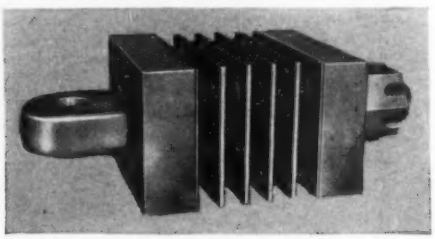
The NC-1 Truck climaxes 20 years of intensive research, providing (through the friction control mechanism shown in cutaway) protection to equipment, roadbed and lading with maximum wear life.



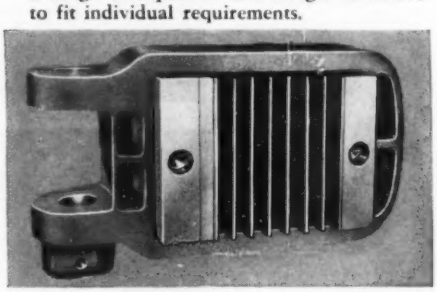
Willison Automatic Couplers save time with maximum safety . . . can be coupled at either end of car or locomotive . . . require no manual assistance. Close coupling eliminates damaging slack, permits high speeds with maximum stability.

NATIONAL *products cut per ton costs!*

Latest example of National's pioneering in better equipment is the NC-1 Truck. Its sweeping advancements over conventional trucks include long soft springs, a friction mechanism—controlling vertical and transverse oscillations, a cast one-piece bolster with large lubricated center connection, and automatic frame alignment. The NC-1 has been designed with the same factor of safety that is required by the Association of American Railroads for full size railroad trucks, and embodies the same features which A.A.R. tests have shown to be essential to produce good riding qualities. For the best in profitable equipment, *always specify National products.*



National M-230 Rubber-Cushioned Draft Gear for cars operating through rotary dump. Soft initial-action, high-capacity rubber pads provide maximum impact protection, lengthen equipment life. Available in a range of capacities and design variations to fit individual requirements.



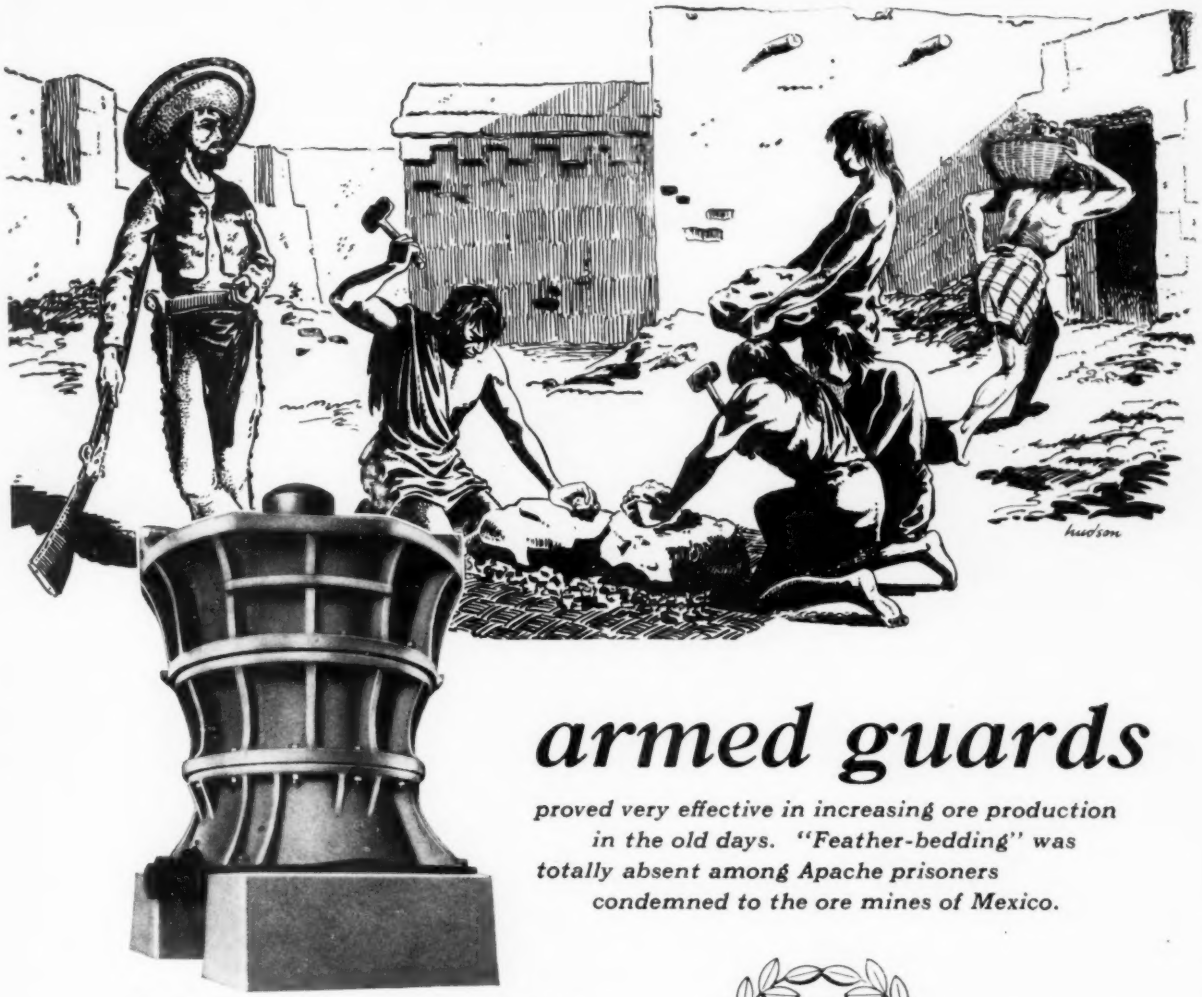
M-225 Rubber-Cushioned Draft Gear for locomotives and large capacity cars not required to operate through rotary dump. Maximum protection in minimum space.

A-3863

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

WILLISON AUTOMATIC COUPLERS • NC-1 TRUCKS • DRAFT GEARS • NACO STEEL WHEELS

NATIONAL Products FOR TRANSPORTATION AND INDUSTRY Est. 1868



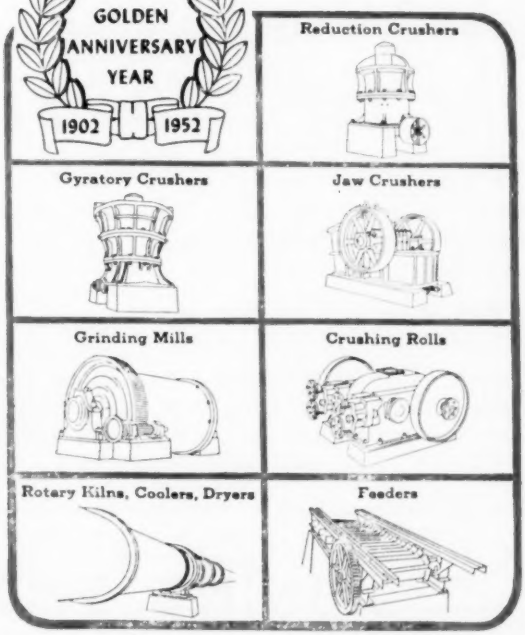
armed guards

proved very effective in increasing ore production in the old days. "Feather-bedding" was totally absent among Apache prisoners condemned to the ore mines of Mexico.

The Traylor TC Gyratory, with its curved concaves and bell head, is a perfect example of advanced crusher design. Bulletin 126 gives complete details.

THE PRODUCTION of ore has passed through many interesting and adventurous phases. For the past 50 years, Traylor has contributed to its growth and development. As the need for more efficient, more productive machinery increased, Traylor kept pace with constantly improved, more dependable equipment. By working with the mining industry for half a century, Traylor knows its problems . . . builds equipment "Traylored" to its needs.

OUR GOLDEN ANNIVERSARY YEAR
1902 1952



Traylor

ENGINEERING & MANUFACTURING CO.
433 MILL ST., ALLENTOWN, PA.

Sales Offices: New York • Chicago • Los Angeles
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A TRAYLOR LEADS TO GREATER PROFITS

They're All Scrap

They're all needed to keep steel production up

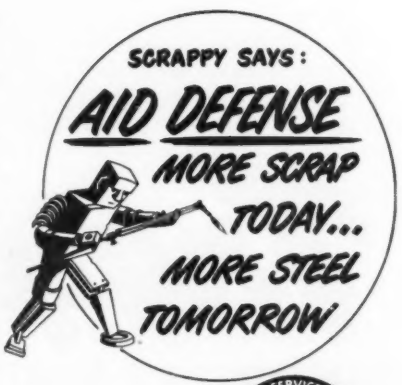
...TO AID DEFENSE

Every pound of unused iron and steel you have is needed to help steel mills and foundries keep production up to rising capacity.

Scrap inventories are alarmingly low. Mills that normally maintain inventories of several months, are now down to a day-to-day basis. Shutdowns are threatened.

One way we can maintain desired level of both military and civilian production is for you to *dig up* and *turn in* your iron and steel scrap now.

Get in touch with your local scrap dealer and write for the free booklet, "Top Management: Your Program for Emergency Scrap Recovery" to Advertising Council, 25 W. 45th St., New York 19, N. Y.



NON-FERROUS SCRAP IS NEEDED, TOO!

This advertisement is a contribution, in the national interest, by

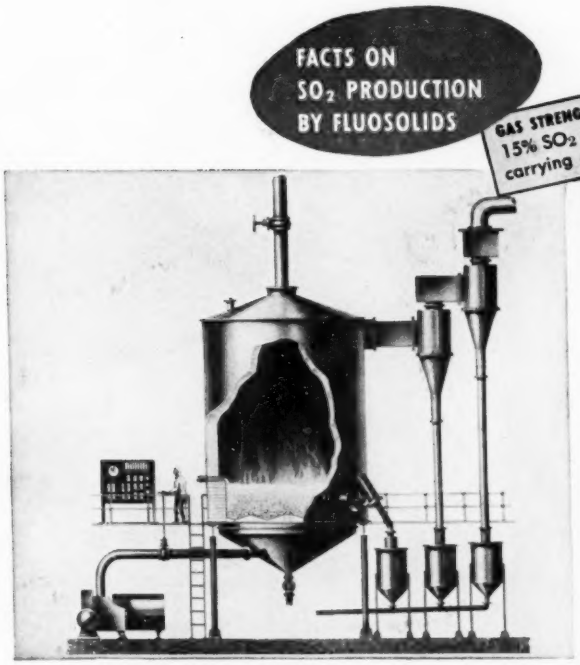
MINING WORLD

A PUBLIC SERVICE PROJECT THE ADVERTISING COUNCIL

Can you use

14-15% SO_2 GAS from PYRITE

Dorrco FluoSolids* will produce it . . . at lower investment and operating costs than conventional roasters.


FACTS ON
SO_2 PRODUCTION
BY FLUOSOLIDS
GAS STRENGTH will average 14-15% SO_2 dry basis from pyrite carrying 48-50% sulphur.
GAS CLEANING EQUIPMENT is smaller because of smaller gas volumes.
FEED can be relatively coarse . . . flotation concentrate to 35 mesh—jig or table concentrate to 14 mesh.
MINIMUM MAINTENANCE . . . no moving parts exposed to high temperature—long refractory life.
NO SCALING . . . temperature accurately controlled below fusion point.
NO EXTRANEOUS FUEL is needed once fluidized bed is up to calcining temperature.
PROCESS SHUT-DOWNS of two or three days present no roasting problem.
COMPLETE INSTRUMENTATION eliminates the personal factor in operation.

● Sulphuric acid manufacturers and all users of sulphur dioxide faced with a shortage of elemental sulphur will find in FluoSolids an economically feasible means of tapping sulphides as an alternate source of SO_2. Utilizing the principle of fluidization, The Dorrco FluoSolids System is a distinct departure from conventional roasters. It brings SO_2 production from those sources down to a reasonable investment and operating cost level.

Its economy, simplicity and ease of operation are indicated by the facts above. For more detailed information write to The Dorr Company, Stamford, Conn., or in Canada, The Dorr Company, 80 Richmond Street West, Toronto 1.

*FluoSolids is a trademark of The Dorr Company, Reg. U. S. Pat. Off.

Better Tools TODAY... to meet tomorrow's demand

DORRCO

DORR

WORLD - WIDE RESEARCH · ENGINEERING · EQUIPMENT

THE DORR COMPANY · ENGINEERS · STAMFORD, CONN.

Associated Companies and Representatives in the principal cities of the world

Here's how rubber-tired TOURNADOZER speeds pit maintenance

STRIPS SHALE THE YEAR 'ROUND

At Middle Branch, Ohio, Diamond Portland Cement Co., strips shale year 'round with C Tournadozer. "Will move as much shale in ½ day as our crawler can in a full day," says Vice President E. R. Evans. For clean-up at plant, Tournadozer runs 3 miles from plant to pit over asphalt roads in a few minutes.

You get action-fast

Tournadozer works anywhere . . . any time, "runs" on big 21.00 x 25 low-pressure tires at speeds up to 19 m.p.h. Tournadozer works in toughest footings . . . up steep grades . . . in any kind of weather . . . through mud, sand, or snow which would stall ordinary crawlers. At a moment's notice, operator can drive rig anywhere over highway or cross country to distant pushing, pulling or dozing assignments. No delays for trailer, blocking, loading or unloading.

With a standard bulldozer blade or interchangeable Angledozer blade or V-type Snow Plow, plus its ability to tow a Rooter or haul Scrapers, Tournadozer is an all-year tool. It has fast, 4-wheel drive on rubber, instant gear change with constant-mesh transmission, torque converter, powerful 4-wheel, disc-type air brakes with a total of 2822 sq. in. braking area, plus fast, easy fingertip electric control.

Check actual job performance reports shown here. Ask your LeTourneau Distributor for additional output figures and other facts on versatile Tournadozer.

Tournadozer, Tournapull, Carryall, Angledozer, Rooter—Trademarks Reg. U. S. Pat. Off. C149-m

LETOURNEAU LET

HIGH-SPEED, RUBBER-TIRED EXCAVATING • HAULING • LIFTING EQUIPMENT

GRADES AND MAINTAINS ROADS

At pit north of Arctic Circle at Kirkenes, Norway, over 25 million yds. of rock are being removed to uncover magnetite ore. Sydvaranger, A/S, Oslo, started hauling with six 40-ton, rear-dump Tournarockers, later added 6 more *plus* 2 C Tournadozers. Dozers build and maintain haul roads and handle shovel clean-up. Combined, the 14 units are moving 12,000 tons of rock and ore per day.

SHOVEL CLEAN-UP

Working at Stanley Mining Company's ore pit at Biwabik, Minn., Tournadozer's principal job is handling clean-up around the ore shovel. On this multi-handling, 24-hr., 7-day a week ore operation, Tournadozer utilizes normal waiting periods to maintain rock dump, clean spillage at crushing plant . . . feed material from surge pile to hopper . . . clear timber ahead of rock drill, etc. Rig has 4 speeds forward, 2 reverse.

DOZES ORE INTO GRIZZLY

On bauxite stripping near Little Rock, Arkansas, 1 Tournadozer handles 5 major jobs every day . . . is on call 24 hours a day. It dozes bauxite ore into 4 to 8 grizzlies . . . maintains quarry rock stockpile . . . cleans up around two 2½-yd. shovels . . . pulls 13-yd. wagon to haul and spread waste material. "It's been doing the work of 2 crawlers," reports the Plant Supt. Operator can change gears without stopping.

MAINTAINS DUMPS

Tournadozer's high-speed and rubber-tired mobility enables it to keep busy day and night for the E. W. Coons Co. at the Genoa strip mine at Eveleth, Minn. During one typical 10-hour *night* shift, the big rig maintained 2 overburden dumps and lean ore stockpile, did clean-up work around 3 stripping shovels, found time to do haul road maintenance besides. No wonder this firm likes their Super C Tournadozer!

PUSH LOADS SCRAPERS

J. Neils Lumber Co., Libby, Montana, teamed this C Tournadozer with 3 C Tournapulls on an 800,000-yd. access road near Rexford. With Tournapulls on 2000′ cycles, Tournadozer pushed 42 loads of sand an hour . . . with 'Pulls on 600′ cycles, 54 loads hourly. Load distance for 9½ pay yards averaged 75′ . . . load time, 30 seconds. With Angledozer blade mounted, rig speeds sidehill work.

PULLS HEAVY EQUIPMENT

Skidding heavy compressor is one of many maintenance jobs Tournadozer handled around Interstate Iron Co. mines near Calumet, Minn. The "C's" big, 186 h.p. diesel engine and 4-wheel drive develop plenty of drawbar pull to handle heavy loads. It pulls Carryall-Scrapers, tows Rooters, heavy-duty trailers, bogged down trucks; skids generator plants, cable-boats, poles, piling, etc.

SPOTS RAILROAD CARS

Here, versatile Tournadozer spots empty rail cars under ore loader for Mesabi Iron Range Mining Company. Powerful rig is handy for switching cars . . . keeps sidings clear for incoming freight. Tournadozer takes shortest route between jobs . . . rubber tires permit it to cross or follow tracks anywhere without planking. Instant-shift gear selection keeps unit pushing without losing momentum.

WORKS SCATTERED JOBS

Leveling spoil, clearing snow, and handling pit clean-up for West Virginia-Pittsburgh Coal Co. mine at Collier, W. Va., Tournadozer drew high praise from Owner F. A. Howe. "It dozes 50% more spoil than a crawler," he said, "and is so fast and mobile that we use it to work all 5 of our pits over a 10-mile route. It saves us 1 to 2 tractors." Drives a mile in a few minutes . . . travels over pavement, crosses tracks.

PLOWS SNOW

In 34° below zero weather, a Rural Minicipality in Manitoba cleared over 600 miles of roads and farm lanes in 142 hours. Drifts were 3 to 8 ft., some almost solid ice. Tournadozer mounted a LeTourneau 12′3″ x 6′6″ V-type snow plow. Vertical divider plate in center cuts frozen drifts . . . eliminates plowing snow back on road . . . big tires and adjustable runner shoe prevent damage to pavement, shoulders.

R. G. LeTOURNEAU, INC., PEORIA, ILLINOIS

New G-300 WAGON DRILL

Especially designed to utilize to full advantage the high drilling speed and strong rotation of the CP 4-inch 70-N Drifter, the new G-300 Wagon drill has a number of *special* features.

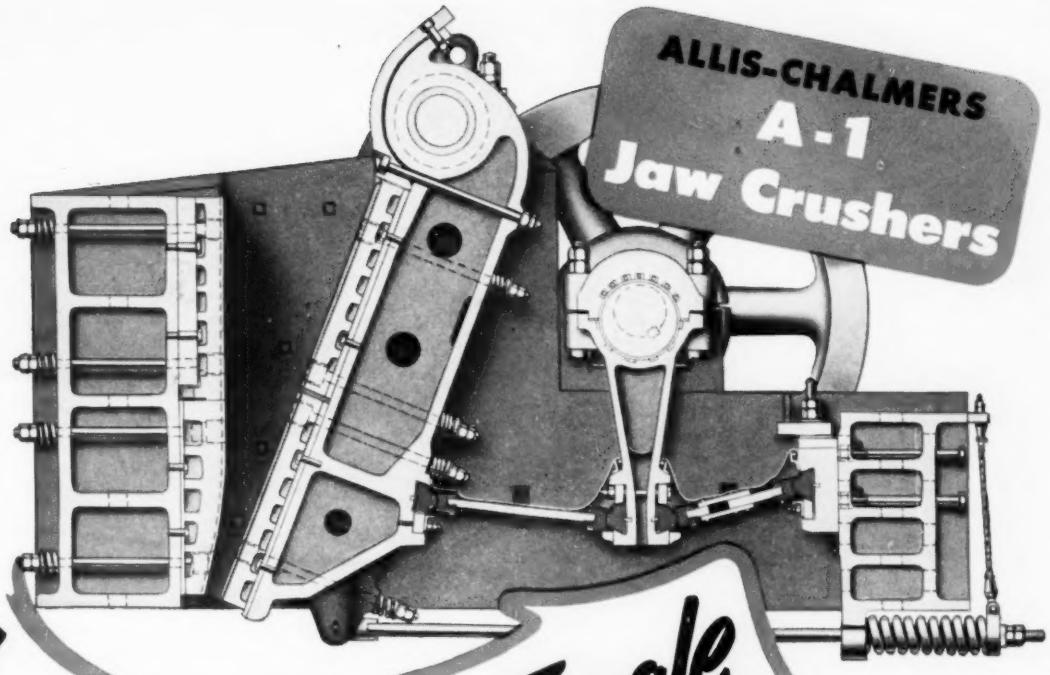
- light-weight but rugged tubular chassis and drill carriage
- specially designed feed motor and cone-gear drive for greater load carrying capacity
- heavy-duty centralizer
- H-member drill support assures rigidity, minimizes vibration
- centralized, conveniently located controls

For faster drilling – at any angle.

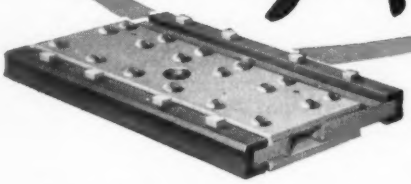
Write for further information

CHICAGO PNEUMATIC TOOL COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES



New Dry Rolling Toggle



✓ Outlasts Conventional Toggles
✓ Reduces Maintenance Costs

Dry rolling toggle was developed by Allis-Chalmers for A-1 jaw crushers ...can be installed on other jaw crushers now in use.

The Allis-Chalmers representative in your area will be glad to give you complete facts about A-1 jaw crushers. Allis-Chalmers, Milwaukee 1, Wisconsin.

NO LUBRICATION True rolling action of toggle ends and seats requires no lubrication. No oil lines or lubricant needed. No oil drip from toggles to pit below crusher. Increased safety and cleanliness!

ROLLING ACTION Replaces friction-producing sliding action. Toggle bearings are cold even after 16 hours of tough crushing!

LESS WEAR Rolling rather than sliding action between toggle ends and seats results in greatly reduced wear. Abrasive dust has little or no destructive effect.

LASTS LONGER Improved toggle is safety shear type. Only inexpensive rivets shear off when unbreakable materials enter the crushing chamber. No need to replace the whole toggle! Rivets can be replaced easily in the field.

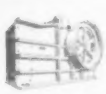
A-1 and Pulverator are Allis-Chalmers trademarks A-3517

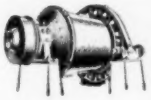
ALLIS-CHALMERS

Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.

Pulverators

Vibrating Screens


Jaw Crushers


Grinding Mills

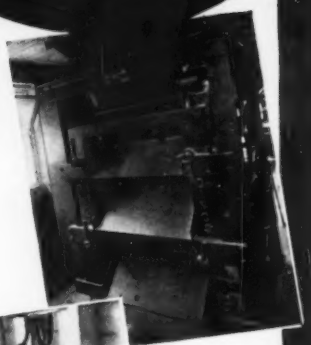
Gyratory Crushers

Kilns, Coolers, Dryers

DINGS

magnetic equipment for every mining requirement!

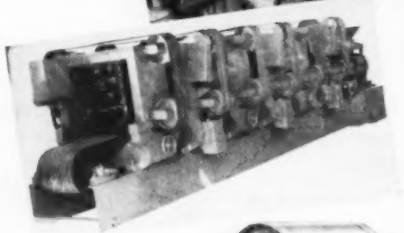
Dings Rectangular Electromagnet provides maximum iron removal above belts or chutes. Triple pole design for great magnetic strength and depth of penetration. Maximum magnetic strength across entire magnet face. Easily installed in any position. Low operating cost . . . trouble free . . . complete range of sizes.



(Right) Induced Roll Separator purifying sand.

Battery of Crockett Separators concentrating magnetite. (Left)

Magnetic Detector signals presence of tramp iron. (Right)



NEW, powerful Cross Belt Separator — with higher selectivity—for concentration and purification (Above)

NEW, powerful, non-electric Alnico Perma-Pulley for purifying, cobbing, protecting crushers, pulverizers, etc. Magnetic permanence guaranteed for life of installation. (Above)

Wherever crushers must be protected against tramp iron, wherever magnetic separation can contribute to the beneficiation of ores, you will find Dings magnetic separators specially designed to meet the requirements of the job. Dings magnetic separators have played an important role in making the extraction of many minerals possible and economically feasible. Shown here are a few of the machines which Dings has pioneered exclusively for the mining industry for the following purposes:

CONCENTRATION—everything from specially designed pulleys for cobbing nickel ores to powerful induced roll and cross belt separators for concentrating manganese, tungsten, chrome, titanium and many other minerals.

PURIFICATION—removing small amounts of feebly magnetic impurities with super high intensity separators. Minerals treated include feldspar, silica sand, salt, bauxite, barytes, nepheline-synenite, gypsum.

CRUSHER PROTECTION—magnetic pulleys, pulley type separators, drums, suspension magnets, spout magnets and magnetic detectors are all widely applied for arresting tramp iron ahead of crushing equipment.

WET TYPE SEPARATORS—Dings has pioneered in the development of wet type separators for concentrating magnetite and for use in new processes for concentrating low grade ores. *Ask for complete details of Dings Separators for Heavy Media Process Plants.*

Take advantage of Dings equipment and experience. For practical recommendations, submit your requirements with 25 lb. samples of material to the Dings Laboratory for testing and analysis. Literature on request.

DINGS MAGNETIC SEPARATOR CO.
4716 W. ELECTRIC AVENUE, MILWAUKEE 46, WISCONSIN

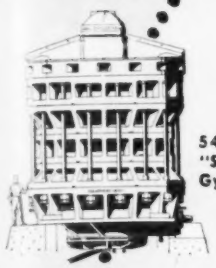
"Magnetic Separation Headquarters Since 1899"

Dings

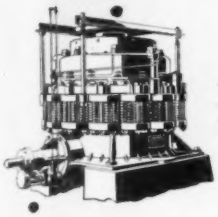
"HIGH INTENSITY"

Another Prominent Mining Company Selects

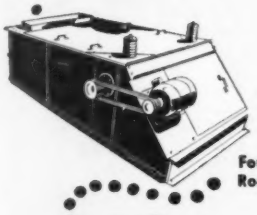
NORDBERG *throughout!*



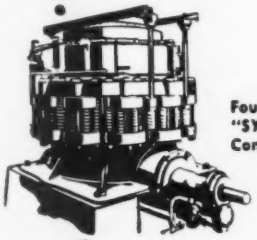
54" super-heavy "SYMONS" Primary Gyratory Crusher.



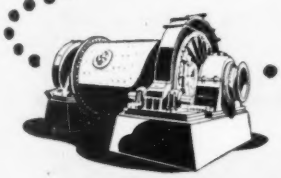
Two 7-foot super-heavy "SYMONS" Standard Cone Crushers.



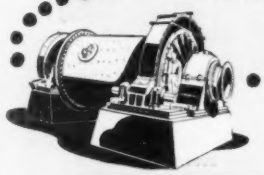
Four 5' x 8' "SYMONS" Rod Deck Screens.



Four 7-foot super-heavy "SYMONS" Short Head Cone Crushers.



Two 10'8" x 17'0" Nordberg (Primary) wet grinding Mills.



Two 10'8" x 17'0" Nordberg (Secondary) wet grinding Mills.

SYDVARANGER
One of the world's most interesting post-war mining developments installs a complete line of NORDBERG-built crushing, screening and grinding machinery for processing TACONITE IRON ORE.

TOTALLY destroyed during World War II, the Sydvaranger iron ore crushing and concentrating plant at Kirkenes, Norway, far above the Arctic Circle, one of the world's outstanding pioneer *taconite* operations, is being reconstructed.

Nordberg-built machinery has been selected for all stages of Crushing, Screening and Grinding. The ore is an extremely hard, laminated magnetite, quite similar to the American magnetic *taconites* of the Lake Superior district.

Nordberg supplied the Sydvaranger Company with a *"SYMONS"* extra heavy duty 54" gyratory for primary breaking ... the strongest gyratory of this size ever built.

The world renowned *"SYMONS"* CONE CRUSHERS, which had been used by Sydvaranger in their former operations, have again been chosen for secondary and tertiary crushing. These are all of Superheavy 7-ft. size in Standard and Short Head types. *"SYMONS"* Rod Deck Screens are being installed for scalping service.

To obtain a high grade of concentrate, very fine grinding is necessary, and in addition to the *"SYMONS"* Primary, Secondary and Third Stage Crushing Units, Nordberg Heavy Duty Primary and Secondary Ball Mills, 10' 8" dia. x 17 0" long, are being installed.

Wherever mining is done, you'll always find Nordberg machinery the first choice of experienced operators. Nordberg Mining and Milling machinery to meet *your* requirements includes Mine Hoists; *"SYMONS"* Gyratory Crushers for primary crushing; *"SYMONS"* Cone Crushers for second and third stage crushing; *"SYMONS"* Vibrating Bar Grizzlies; *"SYMONS"* Rod Deck and Horizontal Vibrating Screens for sizing; a complete line of Ball, Tube and Rod Grinding Mills; and a complete line of Nordberg Diesels for dependable, low cost power production.

Write for literature on the equipment you need.

NORDBERG MFG. CO.
MILWAUKEE 7, WISCONSIN

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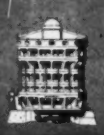
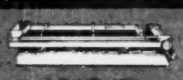
NORDBERG

Machinery for processing ores and industrial minerals



"SYMONS" PRIMARY CRUSHERS

"SYMONS" CONE CRUSHERS

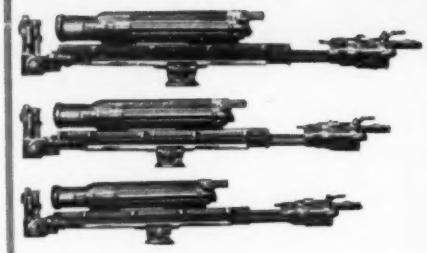


"SYMONS" VIBRATING SCREENS and GRIZZLIES

GRINDING MILLS

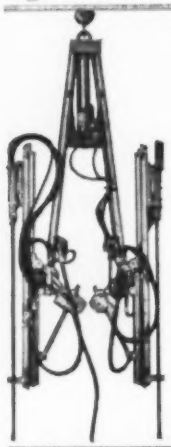
DIESEL ENGINES

★ Air-feed sinkers — 2-way feed, 2 sizes. They take the back-breaking work out of drilling horizontal holes, lighten the load on your miners, and increase tonnages.



★ Power-feed and hand-cranked drifters. Dependable, powerful, and fast. Ideal for columns and jumbos alike.

★ A complete line of sinkers from 18 to 80 lbs. including the popular 45-lb. H10, and 55-lb. H111.



★ The SDR 34 shaft sinker for faster shaft sinking. Fully closed it's 5'6" between drill centers; open 19'3". All adjustments quickly made with air motor.

It's Le Roi-CLEVELAND

for

Rock Drills You Can Count On

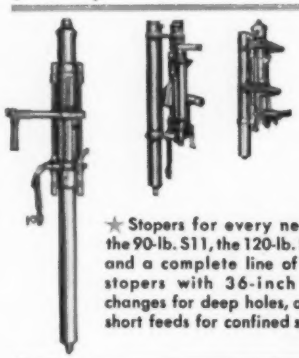
. . . . . fast-drilling, dependable favorites of mining men since 1906

Of course, you know that Le Roi-CLEVELAND builds the popular, easy-holding H10 and H111 sinkers... the fast-drilling PD24, 25, and 14 power feed drifters . . . the S11 and SS22 stopers with trip rotation for easier handling . . . and a mine jumbo that lets you drill out your rounds faster, with greater safety.

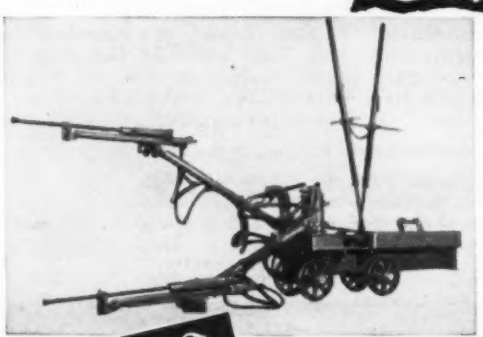
But did you know that Le Roi-CLEVELAND was responsible for some famous "firsts"? Here are a few of them—work-savers that help your miners increase their man-shift production: the air-feed sinker, the offset stoper, the shaft sinker, the stoper jumbo.

So if you have a job of drilling to do—do it with Le Roi-CLEVELAND machines. You can count on them. They're built for speed. And they're built to stay underground, too — where you can use this speed to do more work and cut your costs.

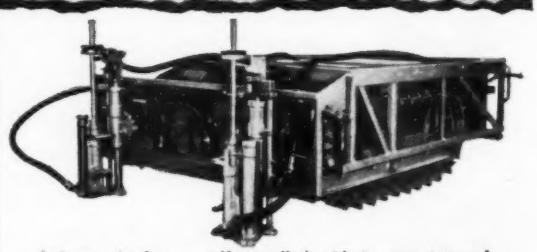
Detailed information about the complete Le Roi-CLEVELAND rock drill line is yours for the asking. Just write us.



★ Stopers for every need — the 90-lb. S11, the 120-lb. SS-22, and a complete line of offset stopers with 36-inch steel changes for deep holes, or with short feeds for confined spaces.



★ The famous MDR Jumbo with air-motor poweredbooms for quicker set-ups, greater safety, faster rounds.



★ Stoper jumbo — self-propelled with its own integral dust-collection system for positive dust control, the latest thing for roof bolting.

LE ROI COMPANY

RD-39

CLEVELAND ROCK DRILL DIVISION

12500 Berea Road, Cleveland 11, Ohio

Plants: Milwaukee, Cleveland and Greenwich, Ohio

RUGGED RELIABILITY
for continuous service

WEMCO Sand Pumps are designed for uninterrupted service — built to stand up under the toughest operating conditions. Careful engineering has eliminated parts subject to sudden failure. Abrasive action has been limited to four extremely hard, slow-wearing parts, and replacement is easy (at the operator's convenience) when pumping efficiency begins to drop.

5 DESIGN FEATURES
THAT MEAN UNFAILING SERVICE

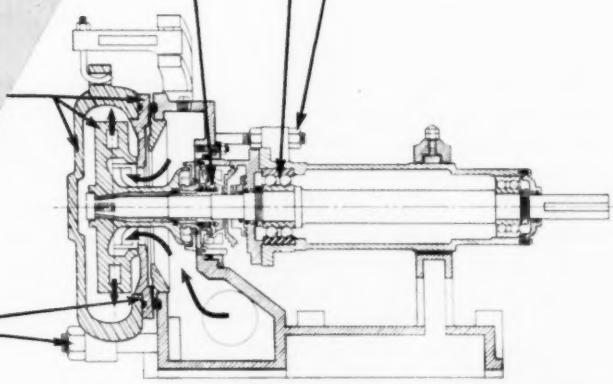
1
External slippage adjustment keeps correct runner clearance.

2
Rigid shaft support is provided by two double-row ball bearings, well lubricated and securely sealed from dirt and moisture.

3
Centrifugal sealing eliminates leakage, friction and sealing water dilution.

4
Extremely hard alloys minimize wear in the case, runner, follower plate and die ring.

5
Quick disassembly features cut time required for replacement of wearing parts to as little as 15 minutes.



Available in sizes from 1¼" to 10". Write today for Bulletin No. P-15-1-1.

OTHER **WEMCO** PRODUCTS

Mobil-Mills • Coal Spirals • HMS Thickeners • HMS Pumps • Densifiers Cone Separators • Drum Separators • Fagergren & Steffensen Flotation Machines • Fagergren Laboratory Units • Hydroseparators • HMS Laboratory Units • Dewatering Spirals • Agitators • S-H Classifiers • Thickeners Sand Pumps • Conditioners

WEMCO
WESTERN MACHINERY COMPANY
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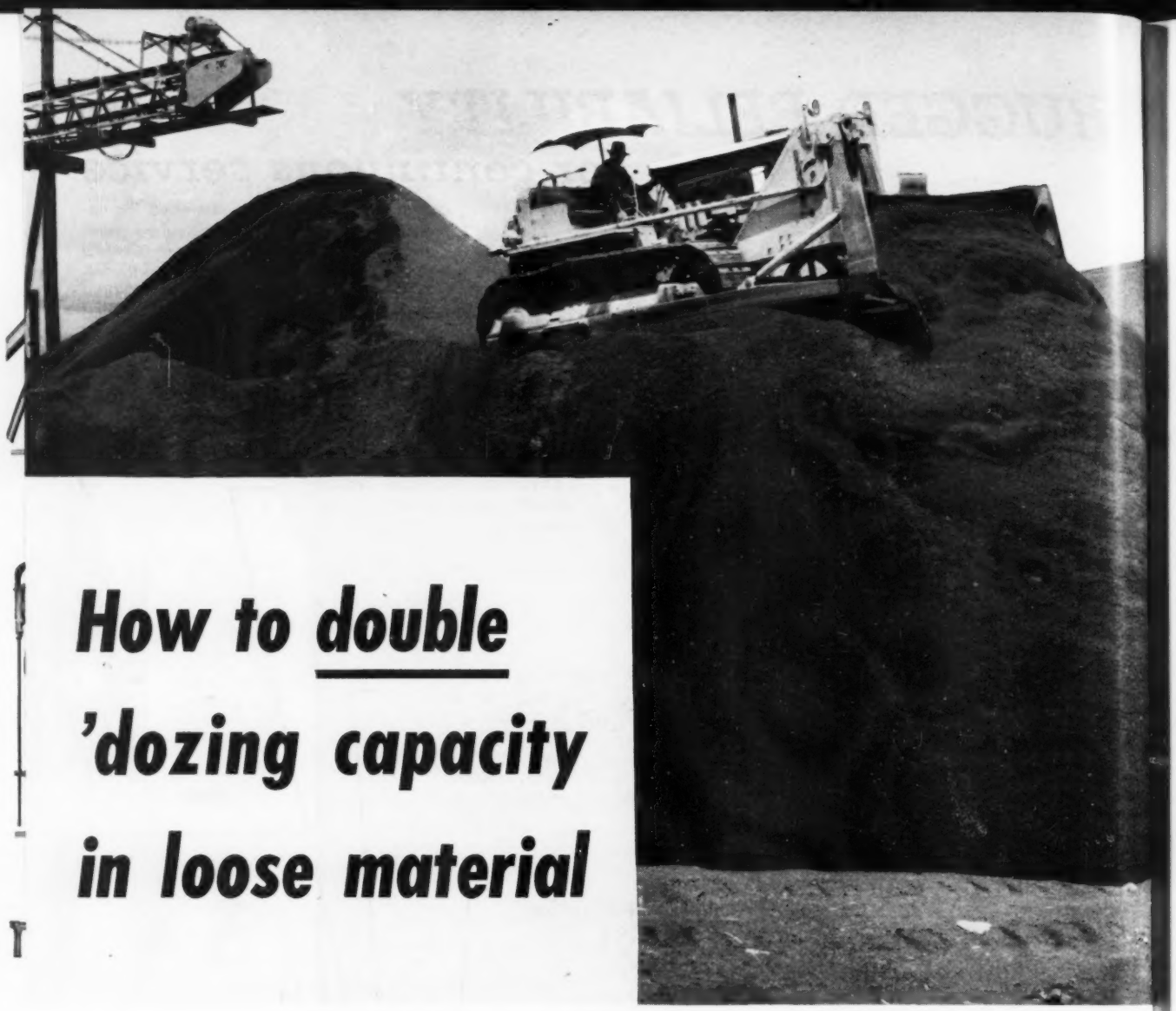


How to double 'dozing capacity in loose material

That sounds like a big order. But it's what we hear from owner after owner who has put the "Caterpillar" No. 8U Bulldozer to work on jobs like this—stockpiling screenings of slag in Pueblo, Colorado.

Frank P. Dykes, Superintendent for Arthur & Allen, goes even further in his statement. He says: "The 8U 'Dozer in my estimation moves from three to four times as much as a straight 'dozer." And he backs it up with figures. The "Cat" D8 Tractor with 8U 'Dozer handles average loads of 12 yards and makes 60 trips an hour on a 70-foot haul. That's 720 yards per hour!

The end sections of the U-shaped blade extend forward, enabling the No. 8U Bulldozer to drift larger loads and hold them without side spill for longer distances. "Caterpillar" heavy-duty construction and heat-treated cutting edges give it long-lived strength and durability. And "Caterpillar" Cable Controls make it easy to operate.

These days it pays to give your earthmoving equipment extra care. Good maintenance will add to its long work life, and regular inspection by the "Caterpillar" serviceman will prevent down-time for repairs. Your "Caterpillar" Dealer is the best friend your machines have. Make the most of all he has to offer.

CATERPILLAR, SAN LEANDRO, CALIF.; PEORIA, ILL.

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES
TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

Pacific Teamwork Pays off

Pacific Products, working together, provide an unbeatable combination for getting out more ore at less cost. Write for Bulletin 215.

ALLOY STEEL & METALS CO.

1862 E. 55th St., Los Angeles 58, California

Mailing Address: Box 15323 Vernon Station, Los Angeles 58, Calif.

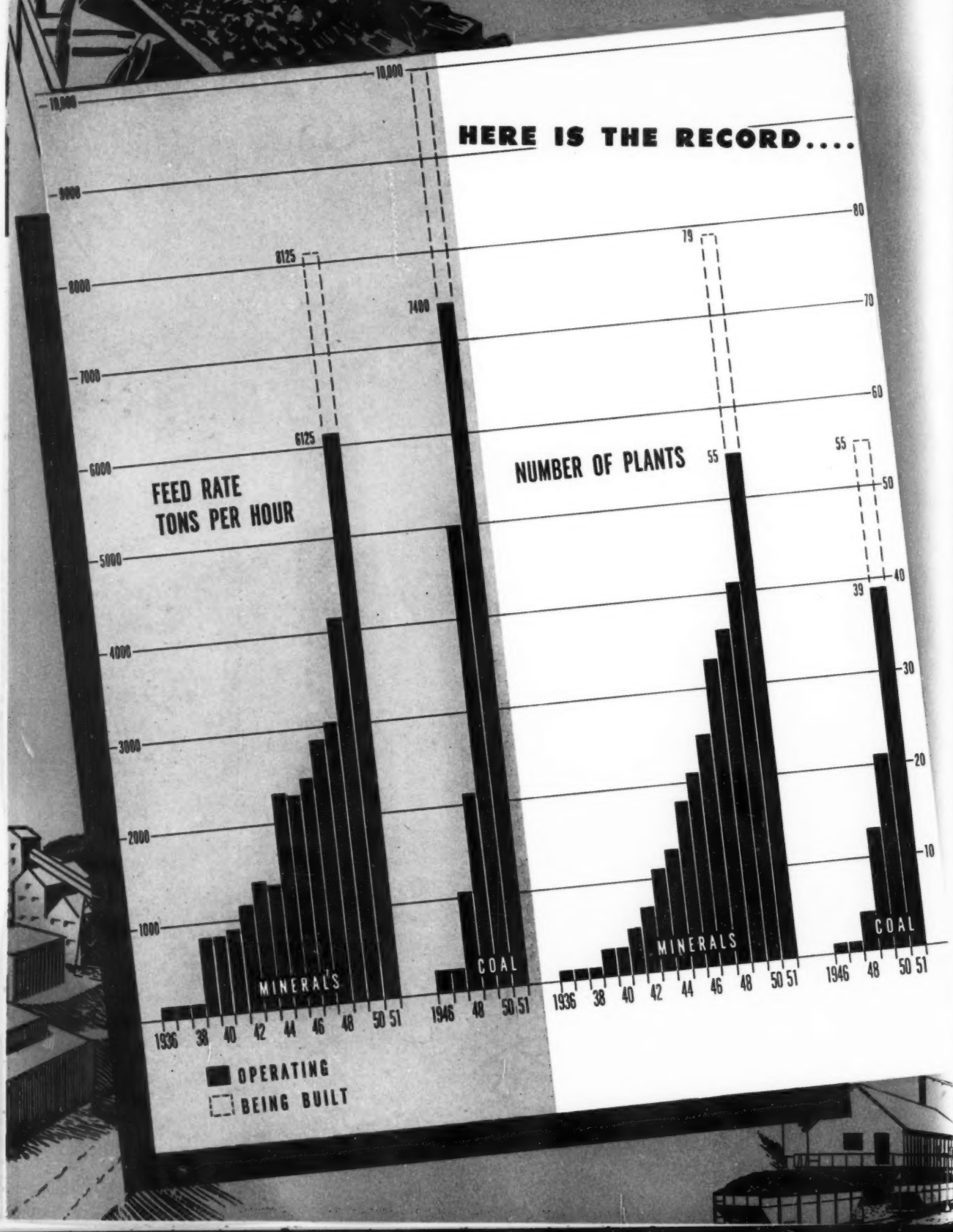
★

Be Specific—Order Pacific

Jaw Crushers, Sheave Anchors, Bit Knockers and Pacific Wearing Parts.

★

YEAR-END PROGRESS REPORT



ON HEAVY-MEDIA SEPARATION

....HERE ARE THE REASONS

A year ago, 62 Heavy-Media Separation plants with a combined capacity of 9300 tons per hour had been built.

Today, 134 Heavy-Media Separation plants built and building have a combined capacity of 18,125 tons per hour . . . a 96% gain in one short year . . . the greatest year's gain in the phenomenal progress made by Heavy-Media Separation.

No other beneficiation process has ever achieved such rapid acceptance by so many leading companies on so much tonnage of so many minerals under such diverse operating conditions. That record is based on these good reasons:

Heavy-Media Separation is the only process that closely duplicates on a commercial scale over a wide size and gravity range the perfect gravity separations obtained in heavy-liquid laboratory tests.

Heavy-Media Separation provides unique and exclusive applications of magnetomotive force to provide the constant control, conditioning and recovery of the separating medium so essential for efficient, economical separation. No other float-sink method provides this exclusive 4-stage medium control with its attendant better over-all grade, recovery and low medium-cost.

Heavy-Media Separation, as no other method – float-sink or mechanical – provides the same uniform excellence of separating efficiency hour after hour (separating gravity maintained within ±0.01 at any gravity from 1.25 to 3.40) regardless of fluctuations in the rate or character of the feed.

Heavy-Media Separation is no longer new or experimental. Its results have been proved by the treatment of millions of tons of ores such as andalusite, brucite, chromite, copper-zinc, diamondiferous ground, fluorspar, garnet, gravel, gypsum, iron, lead, lead-silver, lead-zinc, magnesite, manganese, pyrite, spodumene, tin, zinc and zinc-silicate and anthracite and bituminous coal.

Consider Heavy-Media Separation, alone or in combination with other mechanical processes or as an adjunct to chemical beneficiation, (1) to make directly-marketable metallic and non-metallic concentrates, (2) to upgrade ores and waste hitherto considered too low-grade for profitable treatment, (3) to multiply the benefits of mechanization by minimizing selective mining and eliminating gangue prior to more costly milling operations.

As Technical and Sales Representative for Heavy-Media Separation Processes, we will run tests in the Cyanamid Heavy Laboratory; will work closely with you in the design and initial operation of Heavy-Media Units; and render every other practical help in fitting Heavy-Media Separation into your flow scheme.

AMERICAN Cyanamid COMPANY

MINERAL DRESSING DIVISION

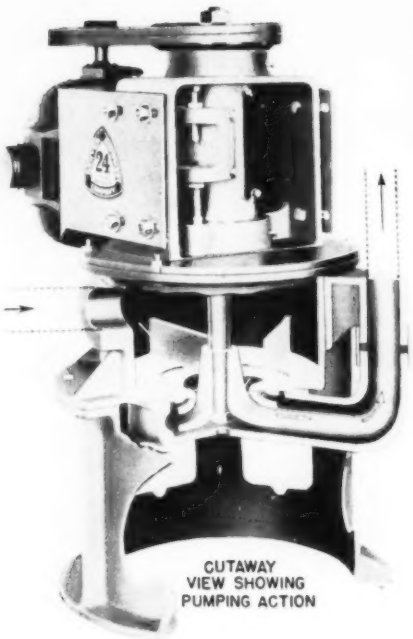
30 ROCKEFELLER PLAZA NEW YORK 20, NEW YORK

MINERAL DRESSING NOTES #19
HEAVY-MEDIA SEPARATION FOR MINERAL BENEFICIATION

To be issued early in 1952

Clearly and concisely explains the exclusive principles of Heavy-Media Separation Processes. Photomicrographs of medium samples demonstrate how unique 4-stage medium control, conditioning and recovery increases recovery and cuts medium loss. Typical operating plants, test results on various minerals and other new useful data will be included. A request on your letterhead will assure a copy of this and other new issues of Mineral Dressing Notes.

Printed in U.S.A.



CUTAWAY VIEW SHOWING PUMPING ACTION

Note How

DENVER VERTICAL SAND PUMPS

Handle Abrasive Solids in Pulp

TYPICAL OPERATING DATA on 2" DENVER VERTICAL SAND PUMP...Serial Number PB1801

Application: Pumping flotation tailings

Head: 20' static head plus 300 feet of 2½" pipe with one gate valve at pump; one 90° medium bend and two 15° long radius bends above pump.

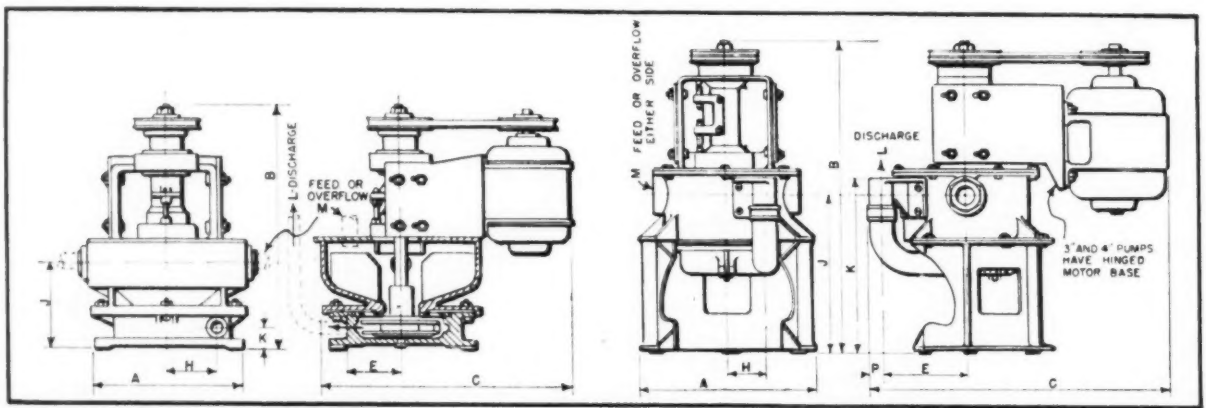
Discharge: Open—horizontal

Feed to pump: 150 g.p.m. of pulp @ 30% solids. Specific gravity of solids estimated 2.4. all minus 2 mm.

Horsepower: 6½ HP consumed

SPECIAL FEATURES

Vertical design protects motor from splash. No sump or feed box required. Handles any material that will flow by gravity. Long service from wearing parts. Pulp flows by gravity into pump bowl; then through feed opening in pump runner due to gravity and suction vortex. This action overcomes stalling, plugging and air locks. Trouble-free operation as stuffing box, packing gland or sealing water are unnecessary.



¾" and 1" SIZE PUMPS — 1½", 2", 3" and 4" SIZE PUMPS

Pump Size	Capacity Based on 25% Solids By Weight: Gal. Per Min.	Dry Tons 24 Hr.	Discharge Head: 20 Ft. RPM	20 Ft. HP*	30 Ft. RPM	30 Ft. HP*	40 Ft. RPM	40 Ft. HP*	50 Ft. RPM	50 Ft. HP*	60 Ft. RPM	60 Ft. HP*	Dimensions—Inches: A	B	C	E	H	J	K	L	M	P	Approximate Shipping Weight Lbs.: ***Motor Drive	**Belt Drive
¾"	15	27	1975	½	2385	1	.....	.....	.....	.....	.....	.....	12¾	22¼	23	5¾	3¼	7½	1¼	¾	1½	.....	315	220
1"	30	54	1150	¾	1450	1½	1624	2	.....	.....	.....	.....	14½	23	27⅜	4½	4¾	8⅛	1⅞	1	1½	.....	490	328
1½"	75	135	1015	2	1230	3	1410	3	1570	5	1710	7½	26½	47⅝	35½	11	5¾	23⅜	26	1½	3	1¾	1060	785
2"	150	270	1000	3	1200	5	1370	7½	1520	7½	1660	10	26½	47⅝	42	13	5¾	23⅜	26½	2	3	2	1235	870
3"	225	400	825	7½	925	7½	1035	10	1150	10	1250	15	42	63¼	65¼	25¼	6½	30⅛	31⅛	3	6	3⅜	2500	.....
4"	450	800	690	10	775	15	855	15	930	20	1015	20	42	63¼	69	26	8	30⅛	31⅞	4	6	4½	2800	.....

*Motor horsepower.
**Shipping weights are for largest motor recommended with highest discharge head shown in table.
***Furnished with vertical flanged pulley for flat belt, or mule drive attachment with round rubber belt for flat or V-Belt Drive.

DENVER EQUIPMENT 24 HOUR SERVICE COMPANY

FLOTATION ENGINEER

DENVER • NEW YORK • CHICAGO • EL PASO

TORONTO • VANCOUVER • MEXICO, D. F.

LONDON • JOHANNESBURG • RICHMOND, AUST.

"The firm that makes its friends happier, healthier, and wealthier"

DENVER EQUIPMENT COMPANY

1400 SEVENTEENTH STREET • DENVER 17, COLORADO

OVER 980 COMPANIES NOW USE DENVER VERTICAL SAND PUMPS

More than 24% of users are repeat customers. Most companies have several Denver Vertical Sand Pumps. There IS a solution to your frothy pulp or tailings pump problems. A letter outlining your requirements will bring you prices and delivery estimates without obligation.

MINING WORLD

and the export edition

WORLD MINING

A Miller Freeman Publication

Published monthly except in April when publication is semi-monthly

JANUARY, 1952

Vol. 14, No. 1

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COVER CIRCLE: The 90-foot-high steel headframe tops the 1,950-foot-deep Star Shaft of the American Smelting and Refining Company at Vanadium, New Mexico.

PUBLISHING OFFICE

Emmett St. Bristol, Conn.

EDITORIAL AND EXECUTIVE OFFICES

San Francisco 5, Calif. 121 Second Street
GArfield 1-5887

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Published by
AMERICAN TRADE JOURNALS, INC.
MILLER FREEMAN, President
L. K. SMITH, Vice-President
W. B. FREEMAN, Publisher

ABC

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SUBSCRIPTION RATES

U.S. North, South and Central American Countries $3.00
Other Countries $4.00
Single Copies $0.35
Directory Number $2.00

DRIFTS AND CROSSCUTS

First Gold From the Orange Free State

During 1951 *Mining World* was privileged to present, for the first time, a number of articles covering significant developments and initial plant operations in all parts of the world.

In keeping with this tradition of "first reports," it is quite appropriate that the first issue of 1952 include an article on the world's newest and most modern gold mill —the 80,000-ton per month plant of the St. Helena Gold Mines, Ltd., Welkom, Orange Free State, Union of South Africa.

Mining World expresses the thanks of miners and metallurgists everywhere, to the company and its officers, for making details of the design, construction and operation of the new mill available for publication and world wide distribution. Rights to the photographs used with the article are copyrighted. Reproduction has been granted only to *Mining World* in the United States and its foreign edition, *World Mining*, in all other countries.

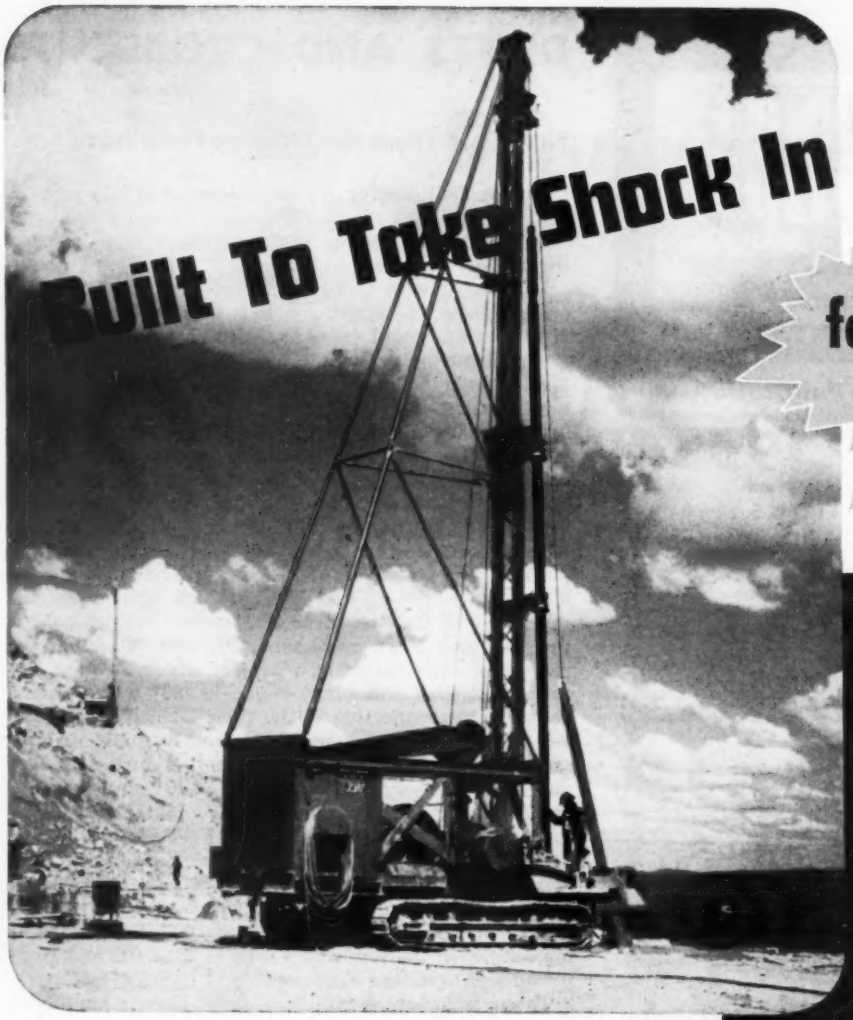
Pouring of the first three 1,000-ounce bars of gold at the mill took place on October 25, 1951. This was the successful culmination of a project which, to date, has cost $22,400,000, and which began in 1937 with the first geophysical prospecting in the area. Geological investigations and diamond drilling followed; shaft sinking, started before World War II, was halted during the war years. Since the war, the greatest underground development the world has ever seen, in a comparable period of time has taken place in the Orange Free State. Diamond drilling of more than 535 holes has been finished, with many additional holes still being drilled. Cost of the first 422 miles of drill hole (an average depth of 4,150 feet per hole) cost more than $15,000,000. Thirteen mining companies have started a total of 26 shafts and completed five. Average shaft depth will be 4,550 feet.

The mill and mine buildings at St. Helena have been built in what was a corn field five years ago. Two shafts have been sunk and connected underground. Mine development footage had passed the 11 mile mark and stopes have been established. Development has been extremely difficult. The area is badly faulted, sudden and large inflows of water have occurred, and methane gas has been encountered.

Development of the Leader Reef and the more important Basal Reef, 35-feet deeper, is continuing. For the quarter ending June 30, 1951, 525-feet of reef assayed 19.4 dwt. (0.97 troy ounce) over a 21-inch width. For the quarter ending September 30, 1,000 feet assayed 11.3 dwt. (0.565 troy ounce) over a 21-inch width. Development of payable reef for the periods was 23 and 27 percent, respectively, of the footage driven.

Mr. S. P. Anderson, chairman, St. Helena Gold Mines, Ltd., said, after pouring the first gold bars, "provided there is a reasonable relationship between working costs and the price of gold, there seems a fair prospect that South Africa's gold output will be as high in the next 50 years as it had been in the last half century." Mr. Havenga, Minister of Finance for the Union of South Africa, pledged government aid when he said, "the government will do nothing to retard the rapid development of the goldfields. It will try to give every facility to help them along."

The faith and determination of the St. Helena company and its officers has transformed a farming area into one of intense mining development—development without precedent anywhere.



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CAPITOL CONCENTRATES

DMA GETS RENAMED AS DMEA BUT SAME FUNCTIONS REMAIN

The Defense Minerals Administration has changed its name to the Defense Minerals Exploration Administration. The change was made to describe more accurately the agency's functions, it was explained.

DMA was set up originally to handle mineral programming and exploration and to act as claimant agency to secure materials needed by the mining industry. However, all but the exploration functions were shifted to the Defense Materials Procurement Agency created by Executive Order in August.

C. O. Mittendorf is administrator of DMEA. It is understood that about 40 employes were retained to handle the exploration functions, while about 70 were transferred to DMPA with Tom Lyon, formerly head of DMA's Supply Division.

• *Regulations Should be Clearly Stated*

The mess over the prices to be paid at the manganese purchase depot at Deming, New Mexico, shows why government announcements should be written in plain English. The regulation, after several months, was finally translated into a milling and handling deduction of $12.00 per ton. The miner did not understand the original gobbledegook and the possibility of a milling charge went completely unnoticed; but the $12.00 per ton deduction he understands very well for it means "curtains" to his operation. This sort of thing is fair to no one.

• *Wage Increases Present Problem*

The recent wage increases are pressing hard on some metal producers and government controllers are scratching their heads to find a method, other than raising ceiling prices or putting a general incentive payment plan into operation, which will give sufficient relief to keep the companies from shutting down.

The first step probably will be some form of overmarket contract with the individual producer who is in a tight spot. In effect, this will be a non-cancelable selective subsidy over the life of the contract, perhaps for a two-year period. This type of contract is new in government dealings and it will be interesting to see how it pans out and what it may lead to eventually.

• *Coordination of Programs Is Lacking*

Under the RFC system of World War II, when the government really seemed to want to stimulate the production of strategic minerals and metals, there was a complete pattern of government support. A "C" loan could be obtained to make a property accessible for sampling and to pay for the sampling; a "B" loan to develop the ore body; and an "A" loan, based upon the ore developed as collateral, to equip the property with machinery and mill. The premium price plan insured a profitable operation which would, in addition, pay back the loans. No money was required from the applicant, except that used for preparation of applications. Mines were opened, metals and minerals poured out, the mining industry boomed, inflation was retarded, and all but a very few were happy.

Today, we have an exploration program in which few can afford to participate, and which permits no development. The results at the present time are not startling as far as the number of projects are concerned, but the main thing is: Where does one go from there?

A production and expansion loan cannot be obtained on inferred ore, so private financing will be required to develop the property before the government will take a look at it again. Thus, it is not unlikely that the exploration work may actually be wasted, except in the case of a placer where exploration and development are one and the same thing. And if the ore found is marginal, it will be a struggle to get either private or government financing.

It is high time that there be some coordination between these programs. The lessons of the last war point the way

• *Economic Blockade Is Urged*

An economic blockade of Russia has been proposed by Herman W. Steinkraus, president of Bridgeport Brass Company. He suggests that the blockade be accomplished by setting up a program to purchase from friendly nations the strategic raw materials now going to the Soviet Union and to China.

In an address in New York recently, Steinkraus said: "How tragic it is that since June 25, 1950, the day of the Korean attack, there have been thousands of tons of strategic materials, rubber, oil, steel and many other items shipped from our country and other United Nations countries to help Russia get ready for war.

"Would it not be better to buy up such materials ourselves and put them in a stockpile rather than permit them to go to Russia on the excuse that foreign trade is so essential to countries friendly to us that they must sell these goods to Russia? Such a program would cost only a minor part of the armament program that we are now engaged in.

"It has been estimated that this entire program could be carried out for less than $2,000,000,000. We would even use our Army and Navy to help us in such an economic program by having them help to prevent the smuggling of strategic materials across borders or oceans."

• *Bolivian Tungsten Deal Approved*

The Export-Import Bank is not as slow as DMA, DPA, RFC or DMPA in approving defense loans for expanding or starting new mining production. The bank recently authorized a $1,000,000 loan to the Mauricio Hochschild interests for the production of tungsten in Bolivia. There is no special criticism of this project, even though the Hochschild interests are known to be well financed. But why, oh why, are we so niggardly with government money when it is to be used at home? We need the tungsten all right, but does Bolivian tungsten alloy any better than the domestic variety? Is a dollar easier to get back from abroad than from Arizona, Montana, Nevada, Utah, or other states?

In this connection, please note the statement made by Defense Materials Procurement Administrator Larson before the annual convention of the National Foreign Trade Council. He said:

"There is nothing essentially different about the understandings required to increase domestic production or foreign production. Whether the investment is to be made in Indiana or Indonesia, the same questions must

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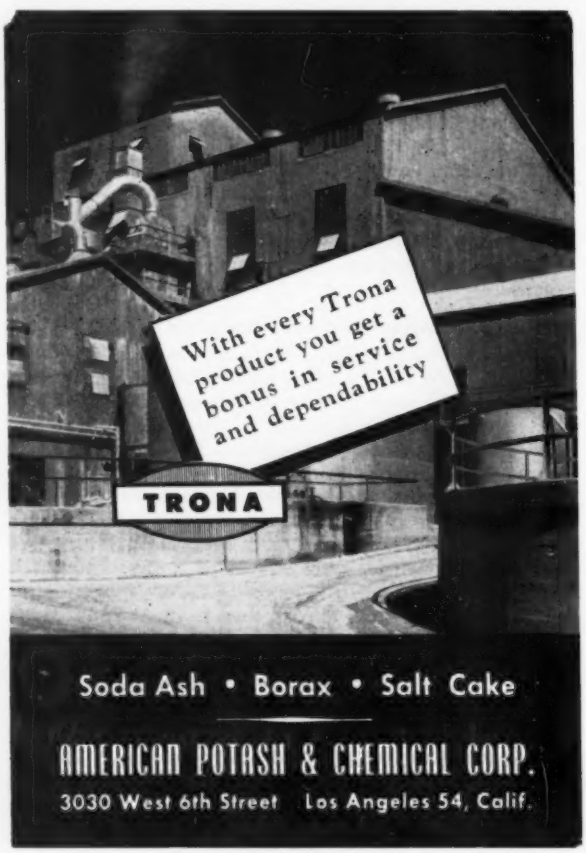
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apply: Will the production enhance the defense effort of the United States? Are the terms of the understanding fair to both parties, with due regard to the taxpaying American public?"

That is what the mining industry wants—one standard for foreign and domestic borrowers!

• *Relaxation of State Labor Laws Opposed*

The demands of defense production are not great enough to justify relaxing state labor standard laws at present, said the U. S. Department of Labor. These laws are the ones that fix maximum work-days, or work-weeks, regulate employment of minors and set out general health and safety regulations.

In a special "manpower policy statement," the Labor Department warned that longer hours tend to increase accident frequency, and that any relaxation in the laws should be clearly defined. The statement also said:

"Industry-wide exemptions should be avoided. Requests for exemption should be granted only upon a clear demonstration of need for critical defense production, after investigation of the facts and only for a specified time, with provision for periodic review at the state labor department for purpose of termination or renewal. Additional shifts are to be preferred to the lengthening of hours of work."

• DMPA Faces Difficult Task

The new Defense Materials Procurement Agency set up by the President on August 28 in order to consolidate the mineral functions of several agencies is organizing very slowly. To date the Senate has confirmed Jess Larson to be administrator, and the staff seems to include only Howard I. Young, Simon Strauss, Alan Bateman and Julian Feiss.

The agency battle over organization of DMPA is still running high, but Larson seems to be taking a firm stand and is winning out. About all of the powers over minerals, procurement and production, both foreign and domestic, have been centered in his hands except for the moment mine priorities and domestic exploration projects. NPA should have priorities, DMPA should take over exploration, RFC Mine loans, and DMA should shut up shop. The unholy wedding between DMA, and the U. S. Bureau of Mines has caused a good deal of criticism and has bred a lot of trouble. Evidently Larson is feeling his way, but if he doesn't look out he may find that things will continue in the same rut.

COMING CONVENTIONS

January 17 through 19, 1952. Annual Convention NEW MEXICO MINERS & PROSPECTORS ASSOCIATION, Carlsbad, New Mexico.

January 31, February 1 and 2, 1952. Domestic Mining Convention in conjunction with the Annual Convention of the COLORADO MINING ASSOCIATION, Shirley Savoy Hotel, Denver, Colorado.

February 18 through 21, 1952. Annual Meeting of the AIME, Hotel Statler, New York, New York.

February 21, 1952. 25th Annual Mineral Institute Industry Meeting of the University of Washington. University campus, Seattle, Washington.

April 21 through 23, 1952. Diamond Drilling Symposium arranged by the Chemical, Metallurgical and Mining Society of South Africa and the Diamond Research Laboratory, Johannesburg, Union of South Africa.

INTERNATIONAL PANORAMA

NORTH FRIENDS STATION, TENNESSEE—The American Zinc Company of Tennessee is spending $340,000 to expand mining and milling operations here. The DMPA has agreed to place a floor of 17½ cents per pound under 7,200 tons of zinc to be produced from the new plant in the next three years.

NEW ORLEANS—The Kaiser Aluminum & Chemical Company is planning a 100,000 ton per year addition to its aluminum plant. Addition of four potlines will make it the largest aluminum reduction plant in the United States.

LA PAZ—The Mauricio Hochschild Sociedad Anonima Minera Industrial has received a $1,000,000 loan from the Export-Import Bank for mine development and expansion of production at its Bolsa Negra tungsten mine.

TEXAS CITY—Stockpiling of tin for the United States national defense stockpile has been suspended. All government tin purchases will be channeled into commercial uses.

YERINGTON, NEVADA—The Anaconda Copper Mining Company has signed an agreement with DMPA for government purchase of a minimum of 128,000 tons of copper, at 25.5 cents per pound, from production during the first six years of operation at Anaconda's Yerington property. Anaconda is to develop the mine, build a concentrator with first production at least two years away.

COPENHAGEN—Mining of iron ore has started near Sonderjylland. The ore is exported to Western Germany.

STOCKHOLM—An iron deposit has been found in southern Sweden. It is at Eksharad in Varmland province.

CARACAS—An agreement has been reached between the Venezuelian government and the Orinoco Mining Company for the dredging and maintenance of an ocean going ship channel through the Macareo and Orinoco Rivers. The channel will permit first shipment of Orinoco Mining Company's iron ore to the United States early in 1954.

SAO PAULO—The Compania Brasileira de Aluminio is planning to build a 7,000 annual ton aluminum plant. It will be the second aluminum plant in Brazil.

WAU, NEW GUINEA—The Golden Ridges gold mill of the New Guinea Goldfields Ltd. has been placed in operation.

RADIUM HILL, SOUTH AUSTRALIA—The South African government has announced plans for the production of uranium ore from deposits long under exploration at Radium Hill.

LUXEMBURG—Shipments of iron ore to Western Germany have been resumed after a long time embargo. Under the first contract 245,000 tons of 25 percent iron ore will be shipped.

EVELETH, MINNESOTA—The Oliver Iron Mining Company is reopening the Leonidas mine. Underground operations were discontinued in 1943. The ore body will now be stripped and operated initially as an open pit.

WASHINGTON—Consumption of fluorspar in the United States reached an all time high—123,216 short tons—during the third quarter of 1951.

PORT ARTHUR, ONTARIO—Shipments of iron ore in 1951 reached an all time record. Steep Rock Iron Mines shipped a record 1,325,000 tons of ore through the port.

ACCRA—The government of the Gold Coast has granted gold mines the right to sell 40 percent of their gold output on the world market.

OTTAWA—Five of Canada's largest gold producers—Lake Shore, Hallnor, San Antonio, Lamaque, and Tech Huges—have elected to sell their gold on the open market rather than under the Canadian government's cost-aid program.

PAINSEVILLE, MICHIGAN—The White Pine Copper Company, a subsidiary of the Copper Range Company has received a loan of $57,000,000 from the Reconstruction Finance Corporation to develop, equip, and place in operation its White Pine copper mine at a rate of 10,500 tons of ore per day.

WASHINGTON—Release of 30,000 tons of lead from the national stockpile has been authorized by the Munitions Board. The lead will be used for "defense needs" under allocations established by the National Production Authority.

SANTIAGO—The first 2,000 metric tons of blister copper from the new Paipote smelter has been sold to the Deutsche Reffinierie at Hamburg, Germany. The selling price was 55 cents per pound.

WALLACE—More mining claims were filed in the Coeur d'Alene mining area in 1951 than in any recent year. Over half the more than 500 claims were staked in the Hunter mining district, near Mullan.

CLEVELAND—The Cleveland-Cliffs Iron Company and the Ford Motor Company are forming a new company to mine and concentrate hematitic jasper from the Humboldt mine on Michigan's Marquette Range. The first 200,000 annual ton concentrating unit is scheduled to be in operation by late 1953 and a second unit of the same size by 1955.

PHOENIX—The American Smelting and Refining Company is to spend $17,000,000 to develop an open pit copper mine and build a concentrating plant at its Silver Bell mine. DMPA will underwrite purchase of 197,000,000 pounds of copper at 24½ cents per pound over a 5½ year period.

MEXICO CITY—Future prices for Mexico's metal exports will be fixed by a board representing mining companies, the government and the miners.

PARIS—Following the decision of the International Monetary Fund to stop trying to make member nations withhold gold for sale for non-monetary purposes the price for gold in the world's largest free market has gone up. United States $20.00 gold pieces sold at prices equal to $58.00 per ounce.

Colorado Miners Sponsor 1952 War Effort Meeting

The January conference of the American mining industry—sponsored by the Colorado Mining Association—has been arranged to assist the war effort by bringing closer together the objectives of government and industry. The meeting will be held in Denver, Colorado on January 31, and February 1 and 2, at the Shirley Savoy Hotel.

An unusual program has been arranged to assist all segments of the mining industry. The industry will express its appreciation to the two Colorado United States Senators and the Senior Senator from Wyoming for their successful handling of tax legislation which is of tremendous benefit to the mining industry. An expression of appreciation will also be extended to Jess Larson, DMPA administrator, and Howard I. Young, deputy administrator, by the nation's small miners.

Association president Blair Burwell has appointed George Teal of the Front Range Mines, Inc. and D. W. Viles, vice president of the Vanadium Corporation of America, as joint chairmen of the program committee.

Discover Several Ore Deposits In Sweden

The Boliden Mining Company expects to start producing from its newly discovered ore deposit "Sturemalm" at Ravlidenfältet in northern Sweden, sometime in 1953. The deposit is said to contain at least 1,500,000 tons of copper-zinc-lead ore, and requires an initial investment of 6,000,000 crowns. Annual capacity will be about 500,000 tons of ore.

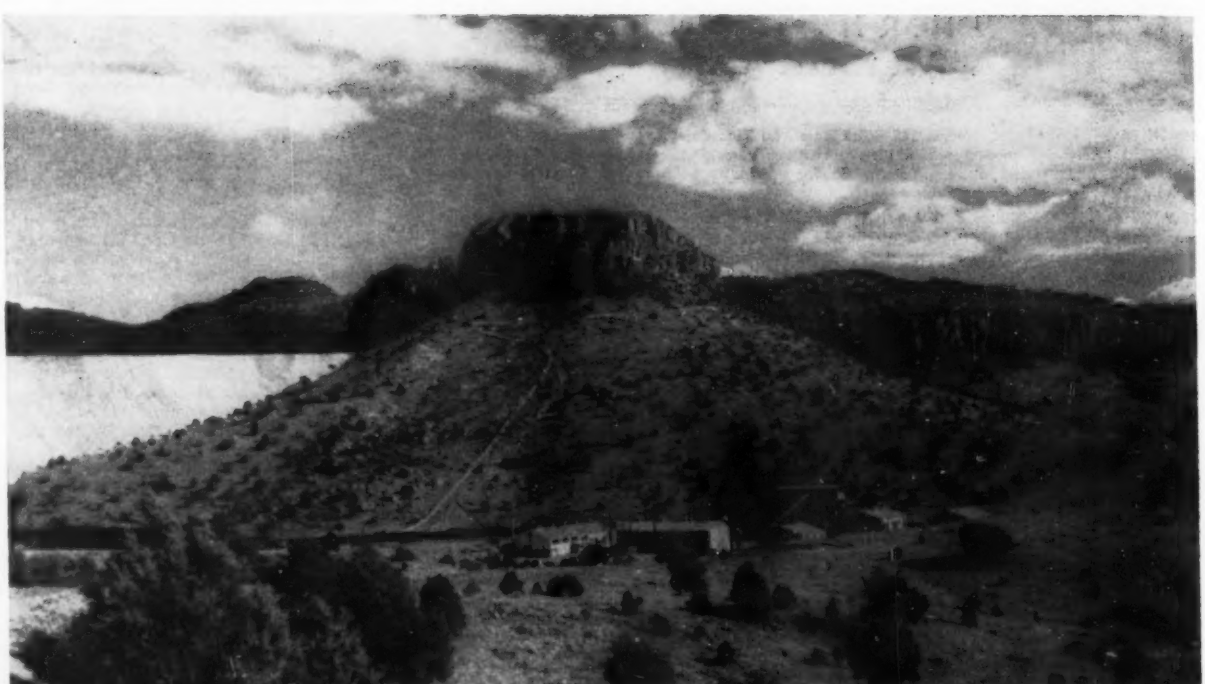
Another deposit has been located at the old Rudtjebäck mine at Adakfältet, northern Sweden. At least 3,400,000 tons of copper, zinc, and sulphur is said to be contained there, at a depth of 260 to 285 metres. Total cost of reconstructing the mine will be about 18,000,000 crowns. The mine is expected to be in operation at half capacity by January 1955 and at full capacity of 200,000 tons by July 1957. The mining rights are expected to go to Boliden.

At Eksharad in the province of Tärmland in southwestern Sweden, iron ore has been found. Investigations are under way to determine the value of the discovery. Ore prospecting in the old Stackebo mine has uncovered some uranium deposits, the size of which has not been disclosed.

Million-Dollar Loan For More Bolivian Tungsten

A loan of $1,000,000 has been granted to Mauricio Hochschild SAMI (Sociedad Anonima Minera Industrial) to assist in the expansion of tungsten production at the Bolsa Negra mine in Bolivia.

The Export-Import Bank is making the loan, while the mine operators have contracted to sell the tungsten produced from January 1952 to December 1956 to the United States Emergency Procurement Service. The mining company will make a substantial investment from its own funds. The money is to be used primarily to buy mining and milling machinery and auxiliary equipment.



The Star shaft and surface plant at Vanadium New Mexico. The Star headframe, crusher plant (right of the headframe base), conveyor belt, and crushed-ore bins make up the surface ore-handling system. To the left is the leaching dump of Kennecott Copper Corporation's Santa Rita open pit.

ASARCO's STAR SHAFT

At high speed and low cost, ASARCO sank two shafts, drove a long connecting level, and developed deep ores at the Ground Hog unit

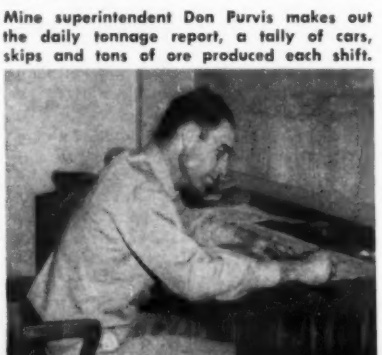
The new system for deep-level ore production at ASARCO's Ground Hog Unit, Vanadium, New Mexico (near Silver City), consists of two shafts, the Star and the No. 5, and a 4,400-foot haulageway, the 1950-foot level, which connects the two shafts.

It is the opinion of many engineers that the overall plan for development and production and also the individual units, are among the finest of type in the world. It is a matter of record that ASARCO sunk the two shafts and drove the connecting 1950 level at a fast rate, which resulted in low unit costs.

Planning

The Star system of the Ground Hog Unit is a result of careful engineering and planning: First, the planners knew the orebody; it had been explored in earlier years by diamond drilling and exploratory workings. Knowing what they were after and knowing the method to be used in mining, the planners laid out the system as a whole—a system consisting of a long level under the orebody from which to tap the ore, and a shaft at either end for hoisting, ventilation, and service. Then they planned each successive operation in detail, procured needed equipment, and went to work.

Mine superintendent Don Purvis makes out the daily tonnage report, a tally of cars, skips and tons of ore produced each shift.



The four-compartment Star shaft was collared in December of 1947 and completed at 1,926 feet depth in February, 1949. Then, after preparatory surface work, the same crew and equipment moved over to the No. 5 shaft site, started work in May, 1949 and completed the three-compartment shaft to a depth of 2,210 feet in October, 1950. In February, 1950, while the No. 5 shaft was still being sunk, crews started drifting from the Star shaft; they holed through to the No. 5 shaft, 4,400 feet southwesterly in late April of 1951.

Development using two vertical shafts and a long connecting haulageway under the orebody is a system that is growing in importance: Where an extensive orebody has been proved prior to development, the system has been applied to vein, bedded, contact and porphyry de-

posits. The Ground Hog development is a model of the system as applied to a long contact deposit.

Ground Hog Ore to Deming Mill

Today, with demand for zinc high, the Star system is going strong, producing 300 daily tons of zinc-lead ore which is shipped by rail on the AT&SF railroad to Deming, New Mexico. There, the company's new zinc-lead selective flotation mill (*Mining World*, September, 1950), which began operations as a 400-ton mill in 1950, has just been expanded by addition of another 200-ton unit. It now concentrates about 675 tons of ore daily—ore from the Ground Hog Unit and custom ore from other nearby operations.

Riddell Mucker

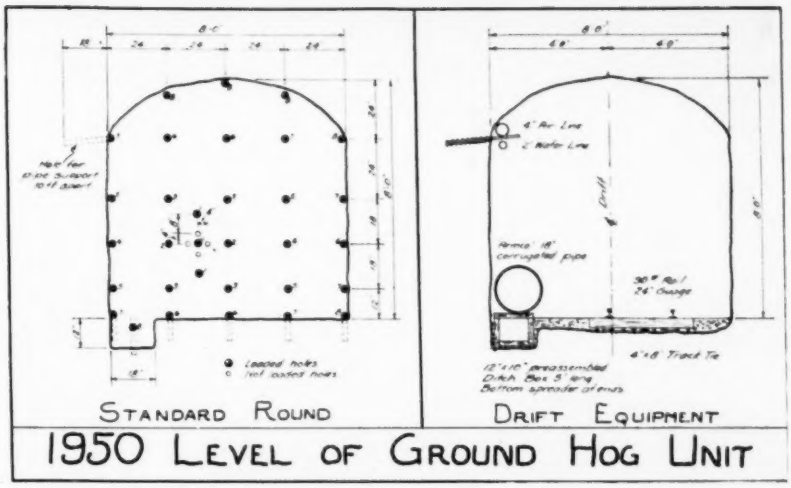
The main vertical development of the mining system is the Star shaft. The No. 5 shaft, 3,800 straight-line feet to the southwest is an auxiliary shaft used mainly for pumping, ventilation, access and service. Running below the ore zones in the Hanover limestone with only four curves from station to station, the 8 by 8 foot 1950-level is the main haulageway connecting the two shafts; it is the main horizontal development.

The Star shaft was excavated 7.5 by 23.0 feet (rock size) for four 5 foot 3 inch wide compartments: Two 4 foot 6 inch hoisting compartments; one 4 foot 6 inch service compartment; and one five foot pump-manway-service compartment. Framed, treated Oregon fir timber was used, 8 by 8 inch on good ground, and 10 by 10 inch in bad ground.

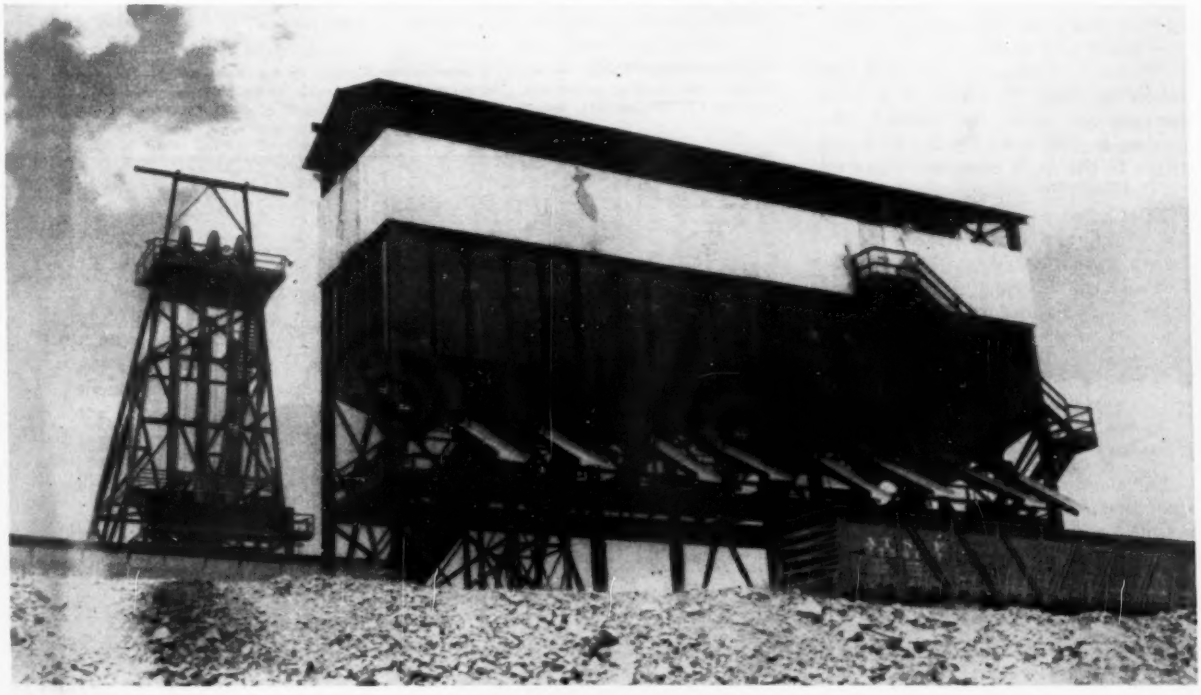
The foreman in charge supervised sinking operations of all shifts. The crew of each shift consisted of a hoist man and a top man on the surface, and five shaft men and a lead man in the bottom.

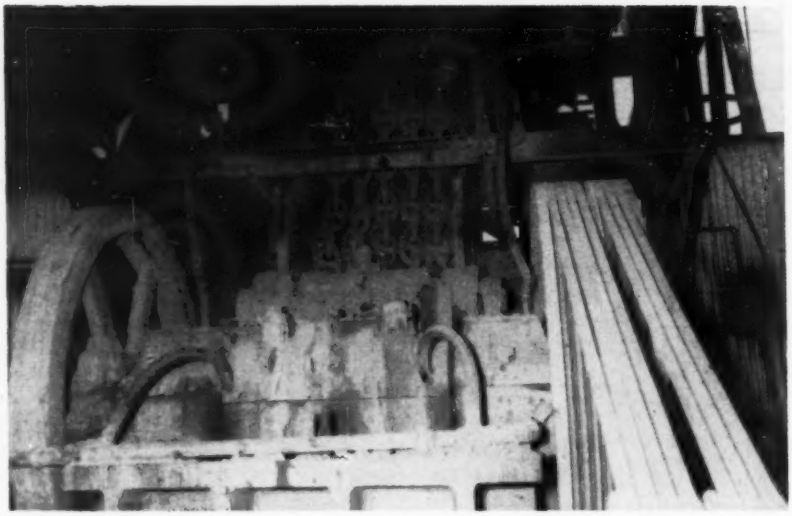
Aided by a Riddell shaft mucker, crews sunk and timbered an average of 5.85 feet of shaft per 24-hour sinking day, and finished the 1,926-foot shaft, complete with stations, chutes, and other features, in approximately one year. The actual cycle worked out to about 20 hours per round netting 7.0 feet of advance, or about 0.47 feet of shaft per manshift underground.

The cost per foot of sinking was $241.75, of which $124.86 was for labor and $105.53 was for supplies. The highest single item of labor cost, mucking labor, was cut to $32.89 through use of the Riddell mucker equipped with a 3/8-yard Blaw-Knox clamshell. ASARCO's Riddell mucker was new and unusual in at least one feature: The operator's carriage, on which the hoists are mounted, was made small



Star headframe on the left and the crude ore bins. Each of the four 150-ton steel, orebins has four chutes, two on each side. The downspout is raised or lowered by a handwheel and ore flow is regulated by an arc gate.





This rotating-chain feeder regulates ore flow from the orebins to the Traylor 18 by 30 inch jaw crusher.

enough to fit in either hoisting compartment and it was equipped with guide shoes so that it could be hoisted during a blast, or to the surface for repair. Proved both desirable and practical, the design simplified maintenance and reduced blast-breakage of the carriage.

The carriage was designed with hand and foot controls for one-man operation. The mucker loaded the broken rock into a conventional 32 cubic foot sinking bucket.

Signals From Cage in Motion

The surface area around the Star shaft, leveled prior to sinking the shaft, provides ample room for six all-steel-and-concrete buildings, a timber yard, the headframe, crushing plant and orebins.

Timber is framed in the shop and taken by fork-lift truck to a timber-storage area. As needed, the timber is delivered by the fork-lift truck to the shaft cage, and lowered to the working place.

The hoisting cages are equipped for signaling from the cage to the hoisting engineer through the R. L. Rutherford Electronic system of mine shaft signals by which a battery-powered transmitter on the cage sends pull-rope signals to the hoisting engineer from a cage whether it is in motion or at rest.

Handling Ore Underground

The headframe is a 90 foot steel structure. The hoist is a Nordberg double-drum, rated at 1,000 fpm pulling 18,000 pounds. It is driven through single-gear reduction by a 2300-volt, 400-hp Tri-Clad induction motor. In operation, the counterbalanced hoist brings one three-ton skip of ore from the 1950 level every 2.5 minutes.

To minimize handling of three different classes of ore and waste ASARCO transfers ore from three-ton haulage cars into shallow beside-the-shaft pockets which hold one car of ore; an air-operated toggle gate allows ore to flow from the pocket into either standard type skip.

Crushing Ore at Headframe

Hoisted to the surface, ore falls from the skip to a 30-ton storage bin installed beside the headframe; a second 30-ton bin is used for waste; and a deflector shuttle car allows for dumping waste or ore from either compartment into the proper bin. At the outlet of the orebin, a rotating-chain feeder controls the flow of ore to the crusher.

Ore from the headframe bin passes over a two-inch stationary grizzly to an 18 by 30 inch jaw crusher set at three inches. Crushed and undersize products fall to a 24-inch by 125-foot conveyor belt, and are carried upward to a Barber-Greene shuttle conveyor which carries the ore laterally to any one of four in-line orebins.

The shuttle conveyor is a track-mounted belt unit, half the length of the four ore bins which it serves; the belt motion is reversible. To direct ore into any spot in any of the four bins, the operator simply positions one end of the shuttle conveyor over that spot, and starts the belt in the proper direction.

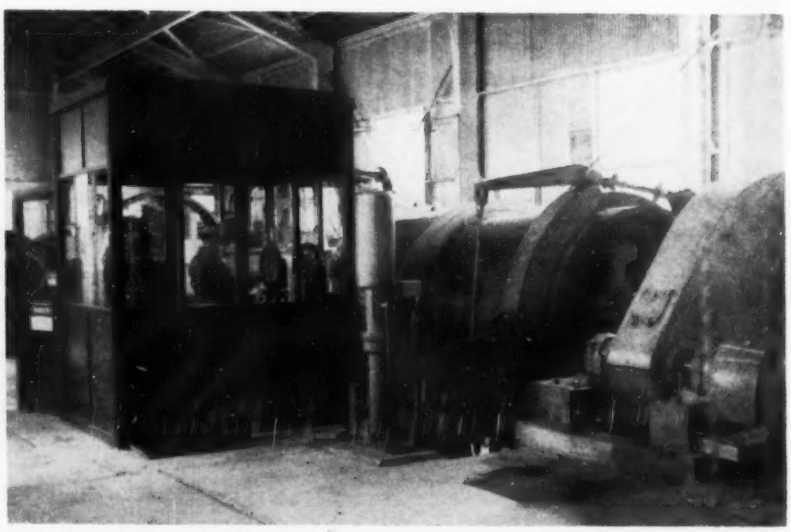
Each of the four bins holds 150 tons; the total capacity of 600 tons provides segregated storage for one to two day's mine production.

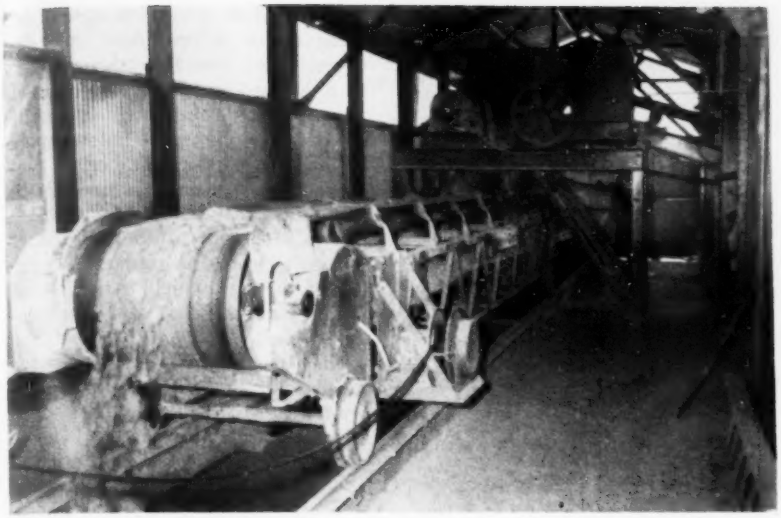
Light Drifters Prove Faster

The 8 by 8 foot 1950 level is untimbered in most places. It is a main haulageway, heavily equipped to provide lasting high-speed haulage. It was driven on the footwall side of the Birdseye-porphyry dike and under the Hanover limestone so that raises driven from it will intersect the bottom of orebodies.

In driving the 1950, crews under the direction of superintendent T.A. Snedden and mine superintendent Don Purvis established a good record for sustained drifting underground: The average rate of advance was 5.233 feet per shift with two men at the face each shift.

Hoistman Alajo Valdez works in a small control room in the hoist house. The control room keeps heat in and sound out. The new Nordberg double-drum hoist is rated at 1,000 fpm pulling 18,000 pounds, has hydraulic-electric control, and a seven-foot-diameter drum with a five-foot face equipped with 1⅛-inch rope.





Belt motion of this 24-inch Barber-Greene shuttle conveyor is reversible. To dump to any of the four orebins, the operator moves the shuttle conveyor so that one end is over the bin and starts the belt in the proper direction.

A two-machine jumbo was used for drilling. Originally equipped with 3½ inch drifters with heavier steel and bits, the jumbos were later equipped with lighter three-inch drifters with one-inch steel and smaller bits; the light equipment outperformed the heavy. An aluminum shell on the drifters allowed a 48-inch steel change. The 60-inch starter steel was capped with a $1^{11}/_{16}$-inch Liddicoat bit; the 105-inch second steel was capped with a $1^{19}/_{32}$-inch Liddicoat. Holes were finished at a drilled depth of 7.5 feet in the two changes.

Special Round for 1950

The special burned-cut round (see cut) chosen for driving the 1950 has three features worthy of consideration:

1) The center burned-cut hole, surrounded by four unloaded burned holes, was loaded with the biggest charge. Fired first, it provided an opening toward which the four cut holes, loaded with the second biggest charge, could break.
2) The charge in the three back holes was three sticks lighter than in side and back cut holes.
3) Powder consumption was 17.82 pounds per foot of advance.

A grade of plus-0.4-percent was maintained from the Star shaft to No. 5 shaft.

Ventilation—Blow or Exhaust

Because the 1950 extended through long stretches with no natural ventilation, a special ventilation system was installed to exhaust powder smoke from the face after a blast, and then to blow fresh air at the face during operations. Two Coppus 15-hp TM-8 fans, one for exhausting the other for blowing, were connected to an 18-inch Armco helcor pipe. The pipe was extended as a permanent air-tight installation.

Two Eimco 21-B Rocker Shovels were used for all loading in the 1950, with one as a standby.

Car Switching

For the Mancha Titan ANX motor pulling 10 C. S. Card three-ton Granby-type cars, a definite schedule of car switching was established. A Canton car transfer switch manufactured by American Mine Door Co., was installed and moved every 300 feet along the 1950. During the driving, the car transfer was thus kept at a distance of 100 to 400 feet from the face.

The Canton car transfer is a unit which allows for shifting an empty car to one side of, and clear of, the main string. It consists of a dolly frame which is shifted over the main track before an empty is trammed onto it; when the empty is in position on the transfer the motorman's helper rolls it sideward on the dolly. Next the motorman trams the newly filled car from the face so that this string clears the car on the transfer. Then the helper shifts the empty onto the track ahead of the train, and the motor trams it to the face.

The motor pushes empties toward the face; cars are shifted from the rear of the string, and full cars are added to the face end, so that the motor pulls loaded trains from the face. Of the transfer, mine superintendent Don Purvis says "I like the Canton type of transfer because it is simple, rugged and easy to install."

Pumping

The 1950 pump station at the Star shaft consists of three 100-hp centrifugals operating in parallel, and pumping water from the 1950 sump to the 1400 level. Three 200-hp six-stage horizontal centrifugals are installed on the 1400. The pump intakes are flooded from nearby sumps.

Sub-leving Stopping

The system of mining at the Ground Hog unit is a sub-level system employing unfilled square-set timber for support. Miners drive two-compartment (manway

Henry Barela, miner, collars a hole with an Atlas Diesel rock drill in 1901 stope. Barela will finish the hole at about five feet with the same steel.

Motorman's helper Frank Garcia operates the control on an air hoist to dump a C. S. Card three-ton Granby-type car into the 1950 Star ore pocket. Two pockets are installed, one right beside each of the two hoisting compartments.

and chute) transfer raises to pierce the bottom of the orebody; raises are planned to extend upward from the 1950 level at an angle of 55 to 60°, and are spaced on 200-foot centers along the orebody. In the ore each raise is continued vertically to the 1800 level. Next, miners drive a 200-foot-long sub-level drift along the bottom of the ore to connect adjacent raises. Then, from the sub-level, at the center point between transfer raises, they raise a square-set slot the width of the orebody (2 to 12 sets) to the top of the orebody (or to the 1800 if the ore extends above the 1800).

Working from the slot, miners breast down the first set all along the slot; they raise to the stope-top before timbering so that broken ore falls in the untimbered slot. When the slot in the first set is complete, it is timbered from the bottom, and the next set is breasted in a similar way. Ore falls through the untimbered slot to the bottom, is cross-slushed to the sub-level drift, slushed to the transfer raise, and flows to a chute mouth on the 1950 level. The ore is then drawn into cars, and trammed to the Star shaft for hoisting.

All vertical drilling (raises and initial slots) is done with 2¾" stopers using Liddicoat single-use bits.

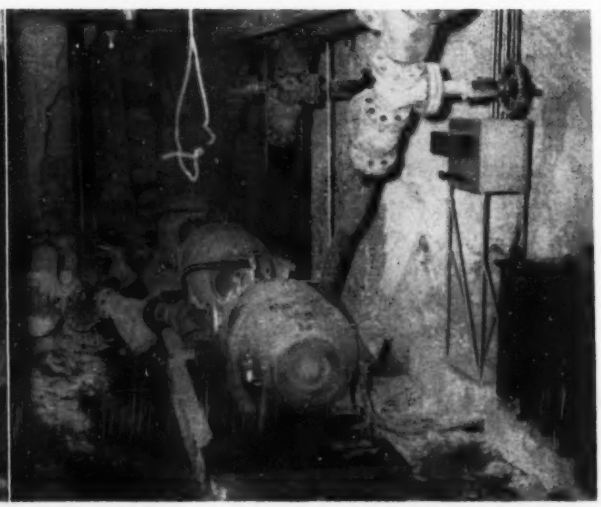
All breast drilling (stoping, driving of sublevels and small drifts) is done with Atlas Diesel 46-pound, RH656W, Rock Drills mounted on an Atlas Diesel pneumatic pusher leg with 52 inches of travel. The Sandvik drill steel, designed for these drills, is one-piece carbide-tipped steel five-feet three-inches long. Using a single change of steel miners breast a round which usually breaks enough ore to allow space for one set of stope timber. A second change, used if needed, is seven-feet ten-inches in length. Don Purvis reports a substantial reduction in overall drilling cost through use of the lightweight Atlas Diesel drills, pusher legs, and carbide-tipped steel.

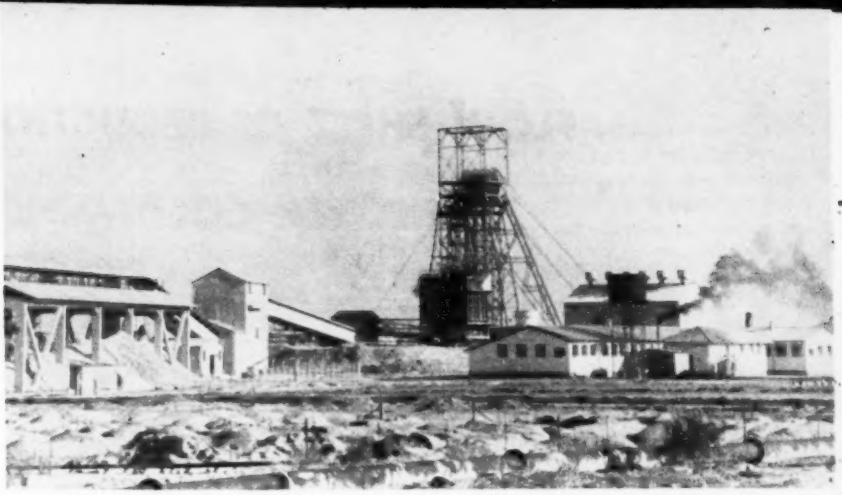
The usual cross-slushing setup consists of an air-driven double-drum hoist pulling a 30-inch scraper. In the sublevels, or in main slushing drifts, electric slushers pull 34-inch scrapers. Several of Alloy Steel and Metals Company's Pacific Slushmaster scrapers are in use; not yet fully tried for length of service, the new Slushmasters have proved superior to older models in performance.

Future Expansion

The Ground Hog system of ore production and the Deming mill give American Smelting and Refining Company a new and completely integrated zinc-lead mining and milling plant in New Mexico. Like the mill, the mine is provided with room for future expansion. There is no bottleneck in the hoisting, pumping, or ventilation facilities. It is a planned system of production: As superintendent T. A. Snedden says, "we hope we have created a smoothly working unit by eliminating most of the usual headaches in advance."

LEFT: Shiftboss Joe Longacres operates an Eimco 21-B RockerShovel and cleans muck from the track so that a car-mounted slusher hoist can be brought in. Miners are rooming-out for a transformer station on the right. RIGHT: Each of the three pumps on the 1950 pump station is driven individually and directly by a General Electric 100-hp, 2200-volt, totally enclosed induction motor. The pumps, almost hidden by the motors, are Ingersoll-Rand 3GT2R centrifugals.





The No. 4 shaft of the St. Helena Gold Mines Ltd. Mine offices are on the right. To the left of the headframe are the cross belt from the shaft ore bin, the main belt to the primary jaw crusher building and the coarse ore stockpile.

FIRST FREE STATE GOLD MILL

The St. Helena Gold Mines Ltd's new 80,000-ton-per-month plant now in operation uses three-stage grinding, labor and cost saving equipment

In designing and building the St. Helena crushing plant and cyanide mill of the St. Helena Gold Mines Ltd. near Welkom, Orange Free State, Union of South Africa, the foremost aim has been optimum gold recovery, at a minimum of cost. Many years of experience in the great mills of the Witwatersrand, and, more lately, in the West Rand have served as the guiding factors at St. Helena. However, it was realized that many inherent and varied problems would have to be overcome in treating the gold ores of the new Orange Free State mines.

From a metallurgical standpoint, the ore is characterized by rich concentrations of gold, often in thin carbon bands. The reefs are thin and a shortage of suitable tube mill pebbles created a challenge in achieving minimum grinding costs.

Construction and subsequent operation of the 80,000-ton-per-month mill, on its flat site on top of a great blanket of unstable clayey soil, has created the need for special engineering and design.

CONSTRUCTION METHODS

Because of the nature of the soil in the mill area with its heaving and shrinking characteristics, piled foundations for all heavy loads were considered; in order to determine the depth to which piles should be driven, a test pit was put down on the plant site. At a depth of 70 feet, it was found to be still in fissured clay formations, indicating that even at this depth movement had occurred. Owing to the great depth, piling was discarded, and it was decided to limit foundation-bearing pressures to a minimum of ¾-ton per square foot by the use of large reinforced concrete mats. This would prevent movement of units such as tube and rod mills, where it would be troublesome.

In the light of later investigation into the carrying capacity of the soil in the area, it is apparent that this was not the right approach. It now appears advisable to increase foundations loads to restrict movements. However, to take care of movement, the following considerations were taken into account in the design of buildings and foundations:

1. Where movement of foundations would not have serious effect, this was allowed for by construction or expansion joints.
2. Steel-framed buildings were used rather than concrete to give greater flexibility.
3. Wherever possible, heavy structures were kept away from units where movement would be troublesome.

Crusher feed bins and sorted pebble bins were designed as one unit. As these had to carry a large jaw crusher on top, consideration was given to rigidity in design. The entire structure is carried on a large concrete mat heavily reinforced so

LEFT: R. H. Mac William, general manager. RIGHT: Jack Hall, construction engineer.

FLOW SHEET OF REDUCTION PLANT

ST. HELENA GOLD MINES, LTD.

Welkom, Orange Free State, Union of South Africa

LEGEND

PRIMARY CRUSHING AND STORAGE

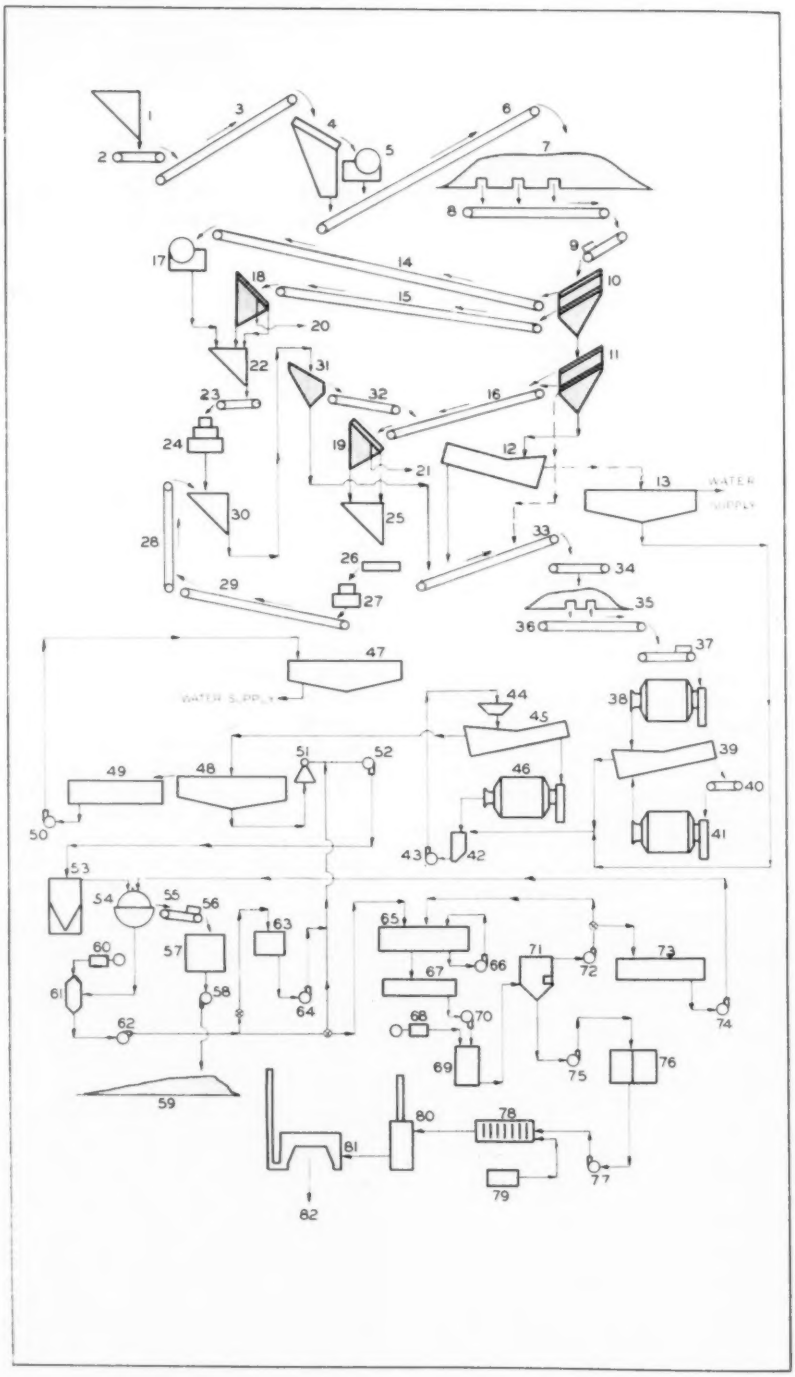
1. Headrame bin No. 4 Shaft.
2. Conveyor belt. 36-inches.
3. Conveyor belt. 36-inches.
4. Sloping diverging grizzly.
5. 24 by 36 inch jaw crusher.
6. 36-inch tripper belt.
7. 4,000-ton stockpile.
8. Two 36-inch belts.
9. Belt and 36-inch Weightometer.
10. Two 4 by 12 foot double deck screens.
11. Two 4 by 12 foot double deck Lowhead screens.
12. 8 by 27 foot rake classifier.
13. Cone thickener. 70 foot diameter by 4 by 8 foot.
14. 42-inch sorting belt.
15. 42-inch sorting belt.
16. 36-inch sorting belt.
17. 24 by 36 inch jaw crusher.
18. Secondary pebble selector grizzly.
19. Tertiary pebble selector grizzly.
20. Secondary pebbles to 24-inch belt.
21. Tertiary pebbles to 24-inch belt.
22. Crusher surge bin.
23. Apron feeders.
24. Two 4½-foot standard cone crushers.
25. Crusher surge bin.
26. Two vibrating feeders.
27. Two 4-foot shorthead cone crushers.
28. Conveyor belt.
29. Conveyor belt.
30. Secondary screen surge bin.
31. Three 4 by 12 foot Lowhead screens.
32. 36-inch conveyor belt. Screen oversize.
33. 36-inch belt. Screen undersize to mill.
34. 36-inch tripper belt.

GRINDING—CLASSIFICATION

35. Fine ore stockpile.
36. Six 24-inch variable speed belts.
37. Three 24-inch Weightometer belts.
38. Three 8 by 12 foot rod mills. 350-hp each.
39. Three 72-inch Simplex spiral classifiers.
40. Three variable speed pebble feed belts.
41. Three 8 by 16 foot secondary tube mills. 350-hp each.
42. Sand sump.
43. Three 7-inch sand pumps.
44. Six way rotary distributor.
45. Six 54-inch Duplex spiral classifiers.
46. Six 8 by 16 tertiary tube mills. 350-hp each.
47. High level water tank. Cone, 50 by 8 by 1 foot.

CYANIDE PLANT

48. Seven cone thickeners. Cone, 70 by 11 by 4 foot.
49. Low level water tank. 70 by 10 foot.
50. Three 10-inch, return, water pumps.
51. Seven variable speed No. 4 Triplex diaphragm pumps.
52. Two 7-inch slime transfer pumps.
53. Eight 33 by 48 foot agitators.
54. Six variable speed rotary filters, 14 by 16 foot.
55. 42-inch residue belt.
56. Weightometer.
57. Puddler.
58. Two 7-inch residue pumps.
59. Slime dam.
60. Three vacuum pumps and receiver.
61. Wet vacuum receiver.
62. Two 6-inch filtrate pumps.
63. Cyanide mixer.
64. Cyanide pumps.
65. Four 50 by 8 foot clarifiers.
66. One 4-inch clarifier circulating pump.
67. Gold solution sump. 30 by 8 foot.
68. Two 14 by 10 foot Crowe vacuum pumps.
69. One 6 by 12 foot Crowe vacuum receiver.
70. Two 6-inch gold solution pumps.
71. Three 36-leaf Merrill pits.
72. Three 6-inch Merrill filtrate pumps.
73. Precipitated solution sump. 50 by 10 feet.
74. Three 6-inch precipitated solution pumps.
75. One 3-inch Merrill precipitate pump.
76. Two 15 by 10 foot lead lined acid vats.
77. Two 3-inch gold sludge pumps.
78. Two 36-leaf filter presses.
79. Zinc sulphate vat.
80. Two double deck calcining furnaces.
81. Two reverbatory furnaces.
82. Gold bullion to refinery.



LEFT: E. H. Chisholm, reduction manager. CENTER: J. N. Sheppard, mill foreman. RIGHT: A. M. Bester, crusher foreman.

that if movement does take place it will move as a unit. The crusher foundations are separated from this mat by a construction joint to allow relative movement between the two.

Tube and rod mill foundations where the trunnion bearings are far apart posed a difficulty. This was overcome by two very deep beams with ties between the trunnion-bearing foundations, extending from floor level down to the mat.

Stockpiles Distribute Load

Crushed ore storage bins were dispensed with and a stockpile substituted, outside the mill building, to keep heavy concentrated loads away from equipment foundations. Stockpile tunnels were designed as rigid boxes across their section, but with transverse construction joints in their length to allow for independent movement of each section. Conveyor structures in the tunnel are of all-concrete construction. The rigid concrete portals carrying the conveyor structure above the stockpile are entirely free from the tunnel. Conveyor galleries are of orthodox steel design with cast-in-place concrete floors, but are hinged at one end and have sliding shoes at the other in order to take up a relatively large amount of lateral movement between buildings. Because of the high winds in the Free State, they are enclosed on the sides to prevent material from being blown off the belts.

Thickener tanks are of concrete and are designed to move independently from the substructures below. Access to the discharge cones under the thickeners is by means of six-foot-diameter concrete pipes with joints packed to give flexibility.

Wide Use of Pre-Cast Concrete

Brown's tanks with heavy concentrated loads are built on mats. Here, due to shortage of steel plates, tanks are carried on structural steel stanchions instead of the usual steel plate skirts.

In the filter plant of the cyanide section, the rotary filter pans are of pre-cast concrete sections held together by heavy tie bolts, with joints suitably packed. Concrete was used in order to combat corrosion.

The residue conveyor under the filters is carried for most of its length on pre-cast concrete stringers and supports to counter corrosion.

Bench marks have been built into foundations in various parts of the plant, and a constant check will be kept to find out how much, if any, movement takes place.

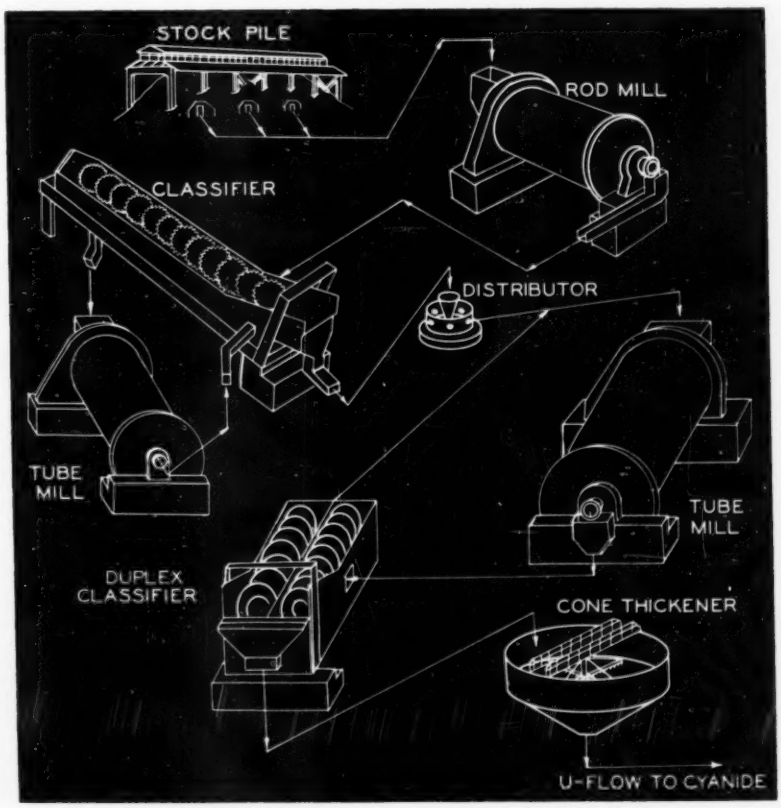
GRINDING PROBLEMS SOLVED

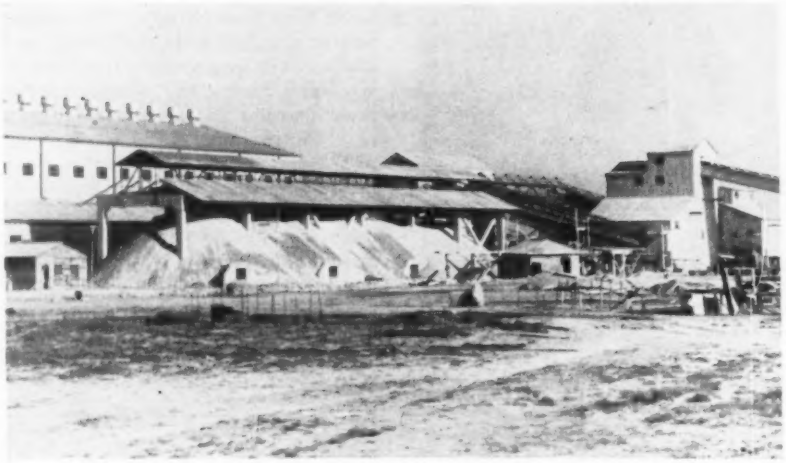
The designers specified rod mills for the primary grinding unit. These mills have the characteristics of selective grinding and rough classification in that they reduce the coarser sizes and permit the passage of the finer material. In this way, a suitable feed for the tube mills is obtained and the consumption of the tube mill pebbles is brought in line with their availability from the St. Helena mine. The function of the St. Helena rod mills is that of a tertiary crusher and the grinding section of the plant can be described as rod mills feeding secondary and tertiary tube mills, both grinding in closed circuit with spiral classifiers.

Advantages of The Rod Mill

The first rod mill to be used in South African gold mills was placed in operation in 1949 by the Marievale Consolidated Mines, Ltd. Its use proved successful and indicated that rod milling would satisfy certain conditions expected to be met in treating ore from the Orange Free State gold mines. The most important of these conditions anticipated that an adequate supply of tube mill pebbles would be difficult to secure. Therefore, it would be necessary to find a crusher or mill that would function economically as a tertiary crushing or primary grinding unit, preparing a feed suitable for tube

St. Helena's three stage grinding circuit.





On the right may be seen the primary screening plant. The 3,000-ton fine ore stockpile is in the center and the grinding-classification building in the background. Note the ends of the three "draw off" tunnels under the stockpile.

mills using only pebbles as a grinding medium. Ball mills were regarded with little favor because of the relatively high steel consumption at a time of increasing steel shortages and higher costs.

The Marievale tests showed that the rod mill answered most of the problems—it reduced to a size suitable for tube milling without producing too great a proportion of slime and without an uneconomical steel consumption. The degree of rod mill feed reduction was also great enough to indicate that pebble consumption in the grinding stages would not be high. Since the rod mill functions as a rough classifier, it was not necessary to install a classifier to close the circuit. It could successfully be used in open circuit with the next grinding stage. For these reasons, the rod mill is incorporated as the primary grinding unit in the St. Helena mill in open circuit with the secondary grinding unit.

Tube Mill Pebble Supply

The source of these pebbles is crushed ore, and in view of their importance in reduction practice, a description of the process involved in securing them should be of interest.

In the St. Helena crushing plant, the tube mill pebbles for both the secondary and tertiary grinding mills are the intermediate or middling products of two single-deck grizzlies. These have been incorporated in Witwatersrand gold mills since the earliest days of their operation. The St. Helena design is, however, an improvement on earlier types, and in it the bars diverge from the feed to the discharge end. One advantage of this diverging lies in the self-clearing effect; another, in the diversion of the middling product (which constitutes the tube mill pebbles) from the undersize.

OPERATING FEATURES

The conveyor-belt system of the crusher plant has a number of features. All belts are equipped with gravity tension devices. This means that at all times tension is maintained at a point which ensures maximum use of power consumed, and that maintenance is confined to replacement operations. All heavy duty belts have vulcanized joints and are equipped with tandem drives.

Fluid coupling drives are standard equipment throughout the conveyor system. With these drives, direct starters can be installed, and the operation of starting and stopping the belts is effected smoothly.

Throughout the crusher section and the whole reduction plant, belt washing is practiced. In addition, fulcrum balanced, rubber scrapers are fitted before the wash sprays on the head pulley ends. The wash from all points gravitates or is pumped to a heavy-duty, 8 by 27 foot duplex rake classifier.

Primary Crushing

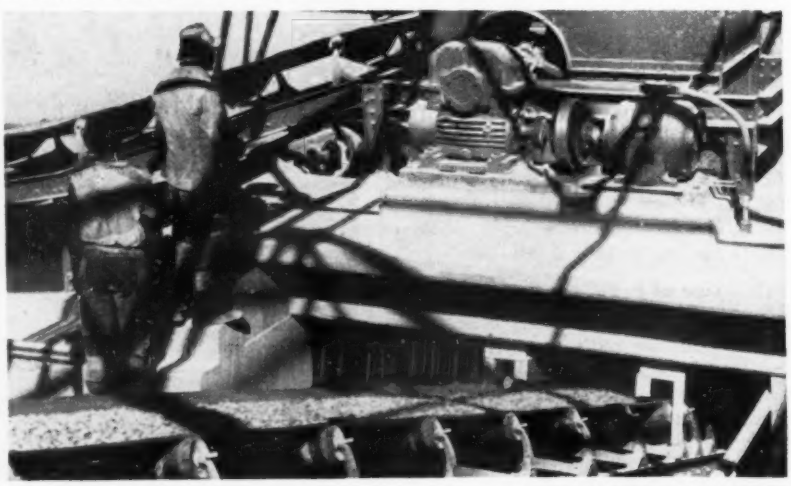
This primary crushing of oversize ore serves many useful purposes—wear and tear on belts are reduced, a relatively even feed and distribution of ore on the belts is maintained, and spillage of the larger lumps on to the floor obviated. The elimination of large lumps (which may cause chute blockage) facilitates an easier draw-off from the stockpile. Demands on labor are minimized; maintenance and replacement charges are reduced.

An additional function of this crusher is to reduce the large sizes of ore to dimensions that can be easily handled by the native sorters, and to dimensions that will expose a greater area to their inspection. It also obviates the old practice of using hand hammers for breaking down large lumps on the belts—a practice which, while effective, detracts from the life of the belt.

An Important Control Device

In the crusher section as in the rest of the plant, devices calculated to save labor, to ease supervision and control, to prevent piles-up of ore, and to reduce wear and tear on equipment have been installed. Not the least important of these is the electric, interlocking trip and alarm system. When a trip occurs, the alarm is sounded, the appropriate

A typical St. Helena conveyor belt transfer point. The belt on the left is from the crushing plant and the belt in the foreground feeds the secondary screening plant. Note the St. Helena belt-drive installation of an electric motor, a fluid coupling and a speed reduction gear.



point on the control panel lights up, and the interlocking system brings all the feed systems leading to the affected point to a stop.

Dust Extraction

Dust is collected in the crusher plant at all crushers, at the various belt transfer points, and at the secondary screens. The dust-laden air, exhausted by fans, is blown into a water-spray chamber in which the dust is removed from the air.

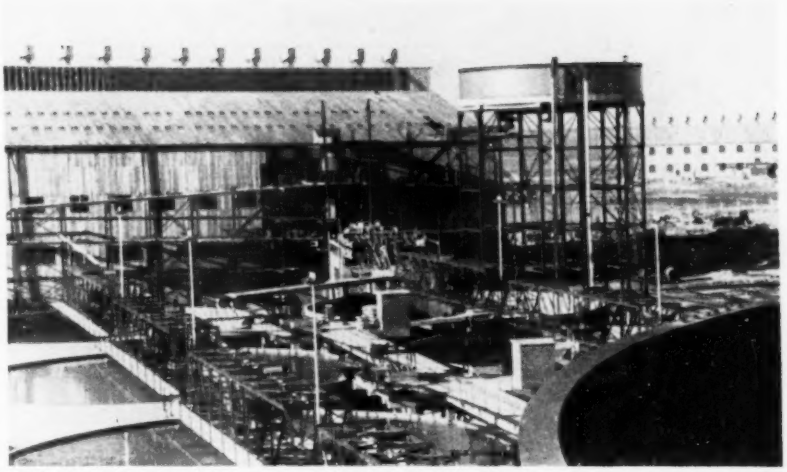
Chutes and Launders

An important design feature to keep maintenance at a minimum is the universal use of "dead box" chutes and bins—that is, chutes and bins with right-angle bases on which the ore builds up and forms its own bed and wearing surface, over which the ore flows.

All the grinding mill discharge chutes and launders are rubber-lined, have rounded corners and bends to minimize wear and accumulation of heavy minerals. The rounded sections result in a non-turbulent flow and reduce the settling, particularly of the heavy mineral constitutents—pyrite and gold. At feed and other points where the direction of pulp flow changes, "dead boxes" are used.

Space, Lighting, and Cranes

In the mill, plenty of space and adequate natural and fluorescent lighting have been provided. Maintenance and replacement of the heavier units, such as the grinding mills and classifiers, has been eased by the installation of an overhead traveling crane. In the crushing plant, a 15-ton capacity overhead travelling crane aids in servicing the crushers and screens.



Thickners in the foreground and the high level water tank from which is drawn the classifier control water. The six way distributor and the sample lip are to the left and below the tank. The highest inclined ramp against the building carries the pulp pipe lines from the distributor to the tertiary grinding circuit. The lower inclined ramp carries the tertiary classifier overflow to the sample lip.

PRIMARY CRUSHING, STORAGE

Ore is hoisted through the vertical, elliptical-shaped, six-compartment, concrete-lined No. 4 shaft in four 7½-ton skips. The skips dump directly into a 270-ton capacity ore bin. Ore is withdrawn onto a 36-inch-wide conveyor belt which discharges over a sloping diverging grizzly. Oversize drops into a 24 by 36 inch jaw crusher. Crusher discharge and grizzly undersize join on a belt to the 36-inch tripper which distributes the ore over the coarse stockpile. Live storage in the stockpile is about 4,000 tons. From the stockpile, ore is reclaimed by two conveyor belts extending under the pile. Each belt is fed by an electric vibrating feeder which is moved manually to any one of the 10 draw chutes. The 20 draw points keep the dead storage in the pile at a minimum. The ore is weighed by a Weightometer as it is conveyed to the washing plant.

From left to right are the No. 4 shaft headframe, belt to secondary screening plant, the crusher building, and to the right the tube mill pebble belt to the grinding-classification building. Note the Weightometer building on the tube mill pebble belt gallery.

Washing Plant

The ore from the stockpile is washed and screened on the two primary, double-deck, inclined, vibrating screens. These are presently fitted with four-inch, square-aperture, screen cloth on the lower deck. The minus-3-inch product and wash water drains to horizontal vibrating screens, one-inch top-deck screens, and a lower half-deck with 3/16-inch screen cloth. This lower deck drains off the water and fines (minus-3/16-inch) which flow to a classifier.

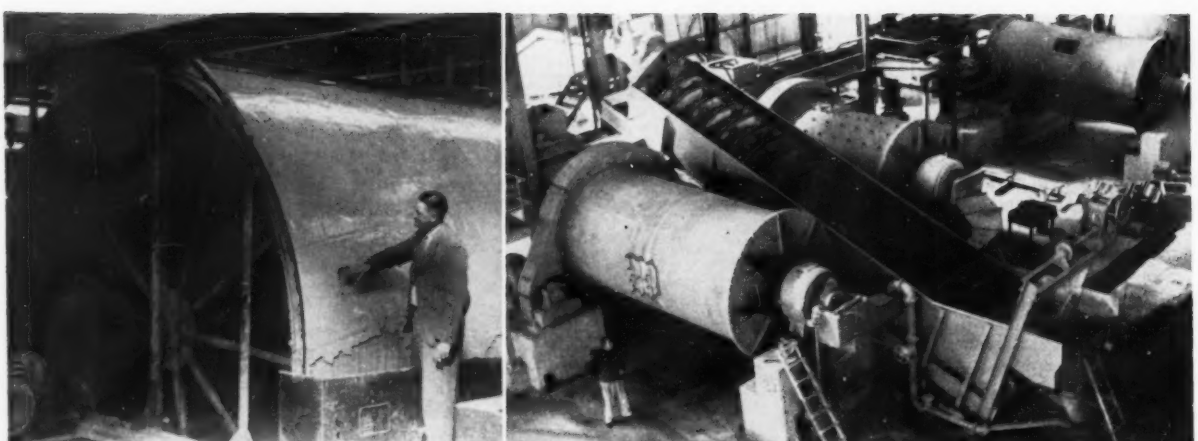
Pebble Selector Grizzlies

Product from the inclined, double-deck, vibrating screens is passed over the secondary pebble selector grizzly, where it is screened and over-size is by-passed to the secondary pebble bin in the crusher building. When this bin is full, the grizzly feed is by-passed to the cone crusher surge bin.

The feed to the second of the two single-deck grizzlies, the tertiary pebble selector grizzly, is similarly a middling product from another set of screens. When not passing over the selector grizzly, this feed is discharged into the surge bin for the Shorthead crushers.

The Screening System

The plus-4-inch product is reduced in a second, 24 by 36 inch jaw crusher and is eventually combined with the minus-4-inch, plus-3-inch material and fed to two 4½-foot cone crushers by apron feeders. The minus-3-inch product and screen wash



LEFT: J. M. Harris, cyanide foreman, examining the cake on one of the rotary filters. RIGHT: The secondary tube mill (left) in closed circuit with the Simplex spiral classifier, and on the far side of the classifier, the rod mill in open circuit with spiral classifier. The classifier overflow can be seen flowing down the floor launder to the sand pump for elevation to the tertiary grinding circuit.

water drop to horizontal vibrating screens, which produce three products. The plus-1-inch material is fed to two, 4-foot Shorthead crushers by electric vibrating feeders; the minus-1-inch and plus-$\frac{3}{16}$-inch drop to the conveyor belt leading to the fine ore stockpile. The minus-$\frac{3}{16}$-inch and screen wash water are fed to a rake classifier.

The combined oversize products from the cone crushers are conveyed to the secondary screening plant (which closes the circuit). The minus-1-inch sized product is screened off and delivered to the fine ore stockpile conveyor belt, together with the minus-1-inch product of the primary horizontal screens and with the classifier coarse sand (underflow). The oversize, plus-1-inch, constitutes what amounts to the circulating load in the crushing plant and is returned for further crushing in the Shortheads.

Waste Sorting Plant

The crushing plant has been designed for sorting of waste rock. Two sorting belts are provided for this purpose—namely, for sorting of the plus-4-inch screen product; and of the middling or intermediate products, at present minus-4-inch, plus-3-inch. No sorting is done initially, but in the future, waste rock will be conveyed by belt to the rock crushing plant (which will produce crushed and sized products varying in size from sand to plus-$2\frac{1}{2}$-inch stone, for construction and road building purposes.)

GRINDING-CLASSIFICATION

The complete mill will have three separate grinding-classification circuits. Each consists of an 8 by 12 foot rod mill in open circuit with a 72-inch Simplex spiral classifier that is operated in closed circuit with an 8 by 16 foot secondary tube mill, and two 8 by 16 foot tertiary tube mills, each in closed circuit with a 54-inch Duplex spiral classifier. Reasons for this unique circuit are that no pumps, air lifts or auxiliary devices are necessary for elevating the discharge from each rod mill or secondary tube mill to the Simplex spiral classifier. Closing of the circuit was made possible by lengthening the Simplex classifier in the secondary tube mill circuit. A single pumping system delivers the pulp to the classifiers of the tertiary tube mills.

Rod Mill—Classifier—Tube Mill

Each rod mill is fed from eight draw-off points in the roof of the fine ore stockpile tunnel, four to each of two belts driven through variable-speed fluid couplings and reduction gears. These two belts discharge onto a single rod mill feed belt fitted with a constant feed fluid coupling drive and equipped with a Weightometer.

The ground product from the primary rod mill and the secondary tube mill flows to the Simplex spiral classifier. The coarse sand is returned, for further grinding, by the serreated spiral. The overflow from the three classifiers flows to a sand sump through launders lined with rounded cast white-iron sections grouted to a concrete bed.

Tertiary Tube Mills

From the sand sump, rubber-lined pumps lift the pulp, which consists of the Simplex classifier overflow, the tertiary (tube mill) discharge, and the thickened product from the rake classifier in the crushing plant, to a six-way rotary distributor. From the distributor, the sands flow through six pipes to each of the tertiary Duplex spiral classifiers. The classifier sand goes to the tertiary tube mill and the classifier overflow passes to the sample lip of the cyanide section. The discharge from each mill flows back to the same sump to which the secondary tube mill discharge flows.

Classification Control

Classification is controlled, within certain limits, by the addition of water to the classifiers. The water is stored in a high-level water tank alongside the mill. The water is pumped from the sump in which the overflow from the cyanide thickeners is collected.

Mill Liners and Rotation

The rod mills are fitted with Hayden or Lorain liners—that is, shell liners with lifter wedge bars. The secondary tube mills have Osborne bar liners and screen discharges, while the tertiary mills are fitted with white-iron block liners and screen discharges. Like the tube mills, the St. Helena rod mills are rotated by a spur and pinion drive, with the drive shaft directly connected to 350-hp. electric motors. The speed of rotation is 17.8 rpm. for the rod mills and 25 rpm. for the tube mills.

Mechanized Pebble Feeding

The supply of tube mill pebbles was planned so that manual handling was completely eliminated. The belt charging system is completely mechanized and incorporates inter-

Times Have Changed . . .

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Missouri lead mine — about 1890. It took strength to swing the hammer, nerve to hold the bit, and skill to place the holes.

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locking alarm and trip circuits. A conveyor belt transports the pebbles from one of the two-in-line bins, as required, in the crusher section to the grinding section (each in a separate building).

Each secondary tube mill has its own pebble bin from which pebbles are delivered to the tube mill by a variable-speed belt. The range of belt speed is from two to four feet per minute. The capacity of each pebble bin is about 50 tons. Each tertiary mill also has its own bin. Rate of feed, in this case, is controlled by a 24-inch, rubber-covered, roller feeder driven through a variable-speed fluid coupling. Tertiary pebble bin capacity is about 25 tons.

CYANIDE SECTION

The cyanide section is operated seven days a week, and in an operating month of 30 days will treat about 80,000 tons. The crushing-grinding section operates only six days a week; in order to provide pulp for Sunday, adequate reserve storage capacity is provided in the cyanide thickeners.

Pulp Feed to Thickeners

The feed to these thickeners is the final mill pulp or product (about 85 percent minus-200-mesh) which is the overflow from the spiral classifiers of the tertiary mill circuit. These classifiers are connected with a single pipe supported on an inclined ramp outside the mill building, the overflow gravitates through this pipe to the sample lip, which is the point at which the cyanide section begins. From this lip, the pulp is distributed to seven single tray thickeners.

The rakes of these thickeners are rotated through fluid couplings, while the triplex diaphragm pumps are driven through variable speed fluid couplings. These pumps draw off the thickened pulp from the thickeners and discharge it into a common concrete launder. Into this launder, the reagents are also pumped which are used for the extraction of gold and silver from the ore.

Cyanide and Lime Make-Up

The make-up unit for these reagents is housed next to the storeroom adjacent to the thickeners. This unit includes a pit in which is placed a drum of sodium cyanide with a split lid. A water pipe is inserted into the drum and the cyanide is washed out at a determined rate of water flow. The cyanide solution flows to a sump into which slaked lime is fed by means of electric vibrating feeders from storage bins at an easily controlled rate. The combined emulsion of slaked lime and cyanide solution is then pumped to the launder through which the thickened pulp flows from the thickeners.

Continuous Agitation-Aeration

The launder discharges into a sump from which the pulp, cyanide, and lime are pumped to eight Brown's tanks. The interconnecting piping (between the eight tanks) is arranged for continuous treatment so that the pulp may be passed through any desired combinations of tanks. The dimensions of each tank are: height, 48-feet; diameter of the cylindrical section, 33-feet; apex angle of inverted cone, 60°.

Agitation and aeration of the pulp in the tanks are effected by means of compressed air. Despite the large diameter of the tanks, no central air-lift columns are employed. Agitation and aeration are efficiently achieved through the use of simple diffusing discs fitted in the apex of the cones.

Filtration and Tailing Disposal

The treated pulp from the last tank flows to six rotary vacuum filters. The rate of flow into the concrete pans or sumps under the filters is automatically controlled.

The cake on the filters is washed by a cyanide solution from which the gold and silver has been precipitated, and which is returned to the filter section. Low-pressure air removes the cake from the filter face, and causes it to drop onto a common conveyor belt equipped with a Weightometer. The belt carries the cake to a puddler, where it is mixed with water to the desired consistency and pumped to the tailing dam by rubber-lined pumps.

The Precipitation Process

The filtered solution is discharged into four sand clarifiers through which it percolates and by which suspensions are removed. The clarified solution is collected in a steady-head sump which functions as a reservoir and obviates any undue surges or fluctuations in the supply of solution to the following installation. The processes effected by these installations include de-aeration in the Crowe vacuum tank; the addition from slow moving belts of zinc and lead nitrate (which in the solution forms the zinc-lead couple: the active agent in precipitating gold and silver from cyanide solutions); and the filtering-off of the gold- and silver-bearing slime on leaf vacuum filters. Each filter unit is equipped with 36, 4 by 6 foot leaves.

Final Product—1,000 Ounce Bars

Once or twice each month, depending on the building-up of pressure on the filter leaves, the cake is washed down into the pits and transferred to the acid-treatment vats. There, the excess zinc is dissolved in dilute sulphuric acid. The residue—gold, silver, and impurities—is removed in pressure filters. It is then calcined in furnaces and finally smelted in the reverbatory furnaces in graphite crucibles with fireclay liners.

The gold and silver are cast in the form of bullion bars, each weighing about 1,000 ounces. These are processed in the Rand Refinery in Germiston, Transvaal, operated by the Transvaal Chamber of Mines.

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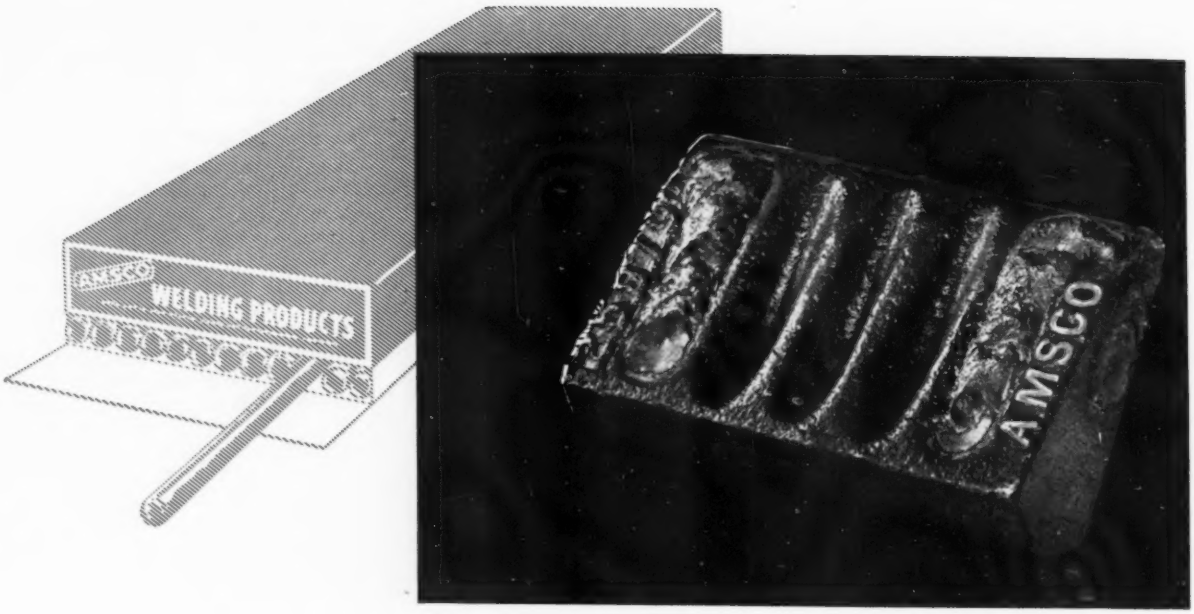

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It's packed with information on the new "Wear-Sharp"—and the entire AMSCO Weldment line. Complete with installation instructions and helpful hints on welding. Be sure to ask for your free copy.

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New AMSCO "Wear-Sharp" repointer holds a straight edge as it wears . . . and stays sharp longer!

Here's a new tooth repointer that is just what you've been looking for . . . the AMSCO "Wear-Sharp", *and it does exactly what the name implies.*

Note the groove design on this new repointer shown above. The outside and end grooves are AMSCOATED with Amsco Hardfacing Electrodes specially recommended for this purpose, while the inner grooves are left as they are. Result?

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E. W. Peterson, mechanical engineer, and R. W. Edwards, superintendent of the Inland Steel Company's Morris mine staff were active in planning and installing the welded steel column. Not shown but one who played a major part in the project is Clinton Grigg, master mechanic at the Morris.

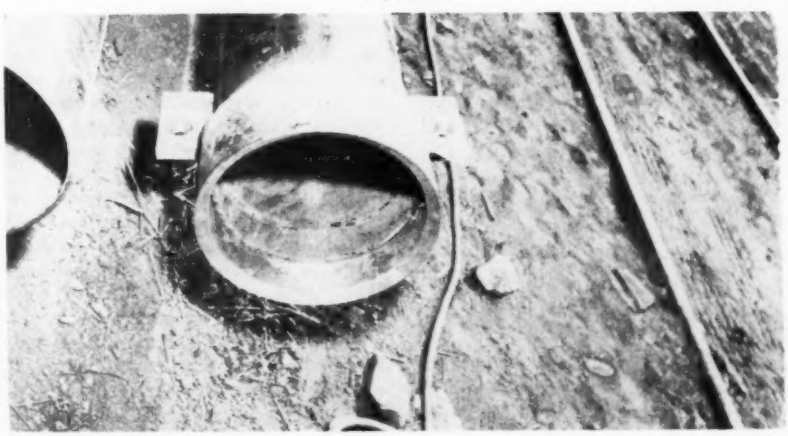
MAKE THE PIPE FIT THE MANWAY

Inland Steel Company's Morris mine staff designs and installs a prefabricated steel water column in a minimum of space and time

Morris mine personnel executed a most interesting and unusual job last fall when the first completely welded steel water column to be installed in the Lake Superior iron districts was placed in operation. The Morris, an operation of Inland Steel Company near Ishpeming, Michigan, was faced with the old familiar problem of having the mine outgrow its pumping capacity and the attendant necessity of increasing the size of water columns. This time, however, events took a new turn. The pipe and ladder compartment was discovered to be so small that the usual steel column with its flanged sections bolted together could not be accommodated.

The staff came up with the idea of using seamless steel pipes, but welding the lengths together at the surface, and lowering them into the shaft in sections in such a manner that all underground fabricating could be done at the stations at the several mine levels. While the job, as handled, was unique in the Iron Range and possibly in the industry, it is reported to be working like a charm. Other mines, even with plenty of room for the installation of an orthodox flanged water column, may be interested in this installation. It was completed in much shorter time than that usually required. A minimum of shutdown time was needed. It was placed in operation without any leakage developing, and it saved a substantial sum of money. Inland's management is not quoting dollars and cents for publication, but they admit it was attractive enough, financially, that they will probably do it again.

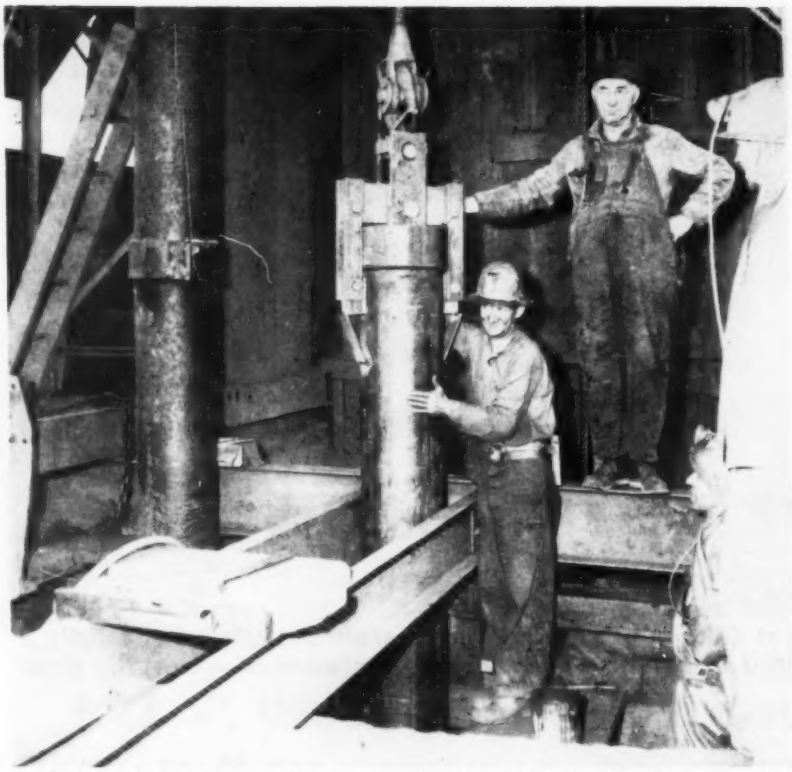
Top end of a 40-foot length of 12-inch seamless steel pipe that will also be the top of the 200-foot section of column between the fifth and sixth levels. Note the advance preparation made. The two ears or lugs are 3½ by 6 inches. Cut from ¾-inch plate, they have 1½-inch holes and have been welded opposite each other four inches from the end of the pipe. The pipe is supported at the shaft collar by resting these lugs on two channels, and the hoisting cable is attached to them for lowering the section into the shaft. The sleeve is welded to the top length of the section only, and it facilitates holding and welding the long sections together underground.



No Room for Expansion

The hoist and ladder compartment at Morris measures 3 ft, 2¾ inches by 10 feet, 10½ inches. When the pumping bottleneck developed it contained an 8-inch water column, a six-inch airline, a 10-inch water column in sections of standard pipe not strong enough for pumping from the bottom level to surface, a 12-inch counterweight pipe, auxiliary pipe, conduit and a ladder and manway. Changes to be made included: Abandoning the airline and removing it. Converting the 10-inch water column to an airline. Installing a 12-inch water column.

As stated before, there was not sufficient room to install the usual water column made of flanged joints bolted together. So, of course, there



Joe Pepin and Norman Brown ready to lower away with a 258-foot section of 12-inch welded steel water column at the Morris mine. Note the hook, swivel, and bridle assemblies used to attach the hoisting cable to the pair of lugs welded to the column. Also note how small pieces of steel plate have been welded below the lugs to act as baffles and preventing them from catching as the section is lowered.

nose was fitted over the lower end and held in place with Allen set screws. This served the dual purpose of keeping the sharp, opened end of the pipe from jabbing into shaft walls and obstructions and keeping foreign material from becoming lodged in the completed column.

Technique of Installation

A small piece of steel plate was welded, as a baffle, under each of the lugs on the top of the completed section. This prevented the lugs from catching on obstacles and causing trouble as the section was lowered. The lowering was a tricky, painstaking, but not dangerous, operation.

Two men, including the mine superintendent, stationed themselves at the shaft collar and levels to check progress and listen carefully to and relay signals from below. Two other men followed the section as it was slowly lowered, rapping the pipe to signal men on the levels.

As the section neared its final position, the protecting steel nose was removed and the end lowered into the collar on the preceding section. Hold-backs were installed between the levels and the sleeve weld was made. Fabrication of the next section was then started and the cycle continued.

Normal pumping is handled by two Prescott horizontal duplex pumps and one Prescott horizontal triplex pump. Their combined capacity, as installed, is approximately 2,800 gpm. delivered at the surface, and the average amount of water pumped is 1500 gpm. These pumps are installed at the fourth, eighth, and ninth levels.

The water-column fittings for receiving the flow from the pumps are pieces prefabricated by the Grinnell Company, and they were much too large for lowering into the shaft along with the column. They were lowered on the cage and installed in the column by welding at the shaft stations. The top of each fitting had a six-inch collar into which the lower end of the succeeding section of the water column was fitted and welded.

The Time Table

As stated before the entire program was carried forward on a carefully prepared, closely followed schedule that provided a definite time and a definite procedure for each of 28 separate operations—a number of them with several sub-operations. The schedule provided for completing the installation in the 14 working days provided by a two-week shutdown. All preliminary work was done prior to closing the mine.

First, in order to remove the airline while the mine was operating, an airline 1,500 feet long was laid on the surface to the Lloyd shaft of the Cleveland Cliffs Iron Company and connected with their main airline. From the Lloyd shaft, the air was again piped back to the Morris through a crosscut on the sixth level.

Not only did this solve the problem of supplying air to the Morris, but it permitted Cleveland Cliff's operators to draw from the Morris air supply while overhauling their compressors without any loss of production. Capacity was adequate for both mines.

After the mine was closed, nine hours of preliminary preparation were necessary before actual fabrication was started. This preparation included putting a skeleton cage below the skip, blocking up and disconnecting the counterweight and moving the counterweight sheave on the landing to line up over the new column, thus making the cage hoist usable for lowering the pipe sections.

The work cycle on the first section of column was rather typical. It included: Twelve hours, complete welding 12-inch pipe for eighth and ninth levels. Eight hours, lower pipe section to ninth level support, install holdbacks at eighth level and make sleeve weld at support. Six hours, measure up for prefabricated piece at eighth level, put in place and make sleeve weld. Sixteen hours, complete welding 12-inch pipe for seventh to eighth levels.

This procedure was followed almost without variation until all seven sections of the column were in place. At that time the counterweight was replaced and the cage put back into use. Water pumps were relocated and connected and subsidiary airlines were connected to the main airline and the main airline was connected to the compressor plant at the surface.

The column was placed in service with no leaks. The eighth level, horizontal, duplex pump caused quite a vibration in the column when first put on the line, a difficulty corrected by installing an air cushion in the discharge from the pump. No other problems developed, and the water column is working out very well.

was no room in the shaft for welding together the 40-foot lengths of pipe.

The solution was to prefabricate, by welding pipe lengths together at the shaft collar, sections sufficiently long to reach from one level to the level above. Thus, tees, valves, and other fittings could be lowered in the cage compartment of the shaft and installed at the desired level. All underground fabrication was held to the point where the shaft opened onto stations.

The prefabricated sections varied in length from just under 200 to slightly more than 400 feet and weighed at the most nine tons. Seven sections were required to complete the 2,000-foot lift.

Preparation for Speed

Plans were laid carefully with a view to closing the mine a minimum time. Advance preparation permitted production of ore until actual fabrication and lowering of the column started. As a result, a two-week vacation period allowed for the entire installation. This resulted in a minimum loss of time by employees and a minimum loss of production by the company.

Material was selected carefully. From the bottom of the shaft to a point just below the bottom of the fifth level, A53 seamless steel pipe 12¾-inches O.D. by 0.500-inch wall, was used. Above this point the same type of pipe with a 0.330-inch wall was used. The heavier gauge pipe weighed 2,600 pounds per 40-foot length, while the lighter weighed 1,750 pounds per length. Ends were beveled at 37½°.

For welding, the pipes were fitted together with a chilled-steel backing ring and were electrically welded with a flat-shaped bead of special, mild-steel, welding rod. The rod was E 6010 AWS classification.

A heavy I-beam was set on the walls of the shaft near its collar, and a pair of lighter channel irons were bolted to it at the point where the water column was to be lowered. The space between the channels was slightly greater than the diameter of the pipe. A special bridle, consisting of rope socket, 20-ton hook block, swivel and yoke for lowering the pipe, was developed. The swivel, to prevent spinning of the column and the hoisting rope in the shaft, was the important feature of this bridle.

Preliminary estimates of the engineering department indicated that about four hours per butt welded joint would be required and another four to six hours would be needed for lowering each section of the column. A careful work schedule involving some twenty-eight operations with an estimated time for each job was developed. Total estimate was 322 hours, and the requirement was 320.

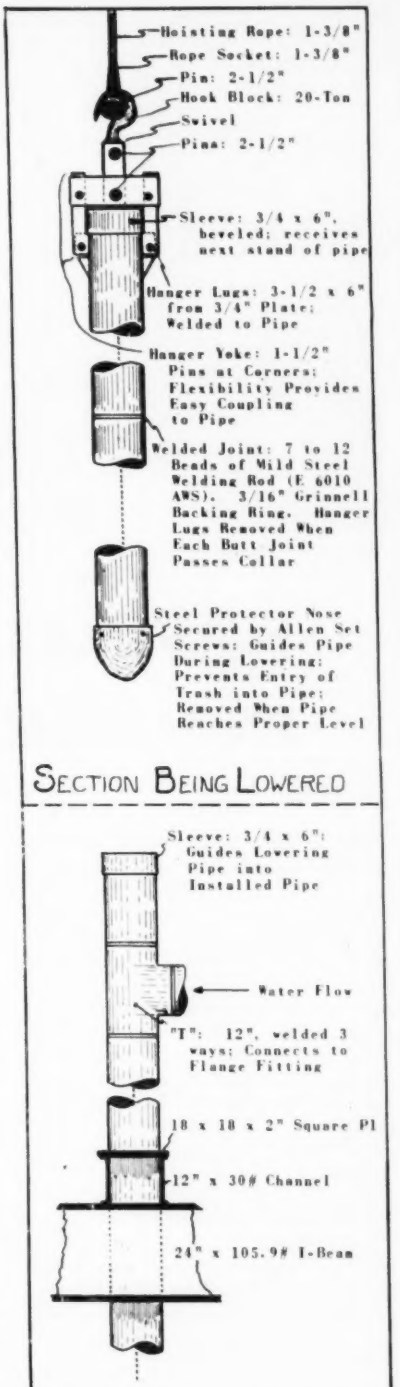
Technique of Fabricating

As stated before, the column was fabricated of 40-foot lengths of seamless steel pipe. Ends were beveled at 37½°. Before positioning at the shaft, two lugs were welded, opposite each other, at a point four inches below the top of each length. Each lug was 3½ by 6 by ¾ inches, and a 1½-inch hole was drilled near the center of each. These lugs rested on the channel iron across the shaft to support the column while the prefabricating was done. They also served as a place to attach the cable for handling the pipe. They were removed by burning with a welding torch as each weld was completed.

The preparation of each 40-foot length was identical except the top length in each section lowered into the shaft. In addition to the regular preparation a ¾ by 6 inch beveled sleeve was welded to the top above the pair of lugs. This ring received the lower end of the succeeding section of column and simplified the alignment and welding of the section underground.

The prepared length of pipe was taken to the shaft by a Koehring truck crane and raised to a vertical position by a Hyster winch on a Caterpillar tractor. The bridle, previously described, and a hoisting counterweight rope from the cage hoist were attached; and the pipe was lowered into the shaft until the lugs rested on the two channels across the shaft collar.

A chilled backing ring, with 3/16-inch shoulder, was fitted inside the top of the pipe and a second length raised into position. Clamps were affixed to each length to hold them in perfect alignment while seven to 12 beads of mild steel welding rod were applied to fill the bevelled area at the joint. After the lugs on the lower lengths of pipe had been burned off the combined lengths were lowered into the shaft until the lugs on the top length rested on the supporting beams. Another length was then positioned and the cycle of operations continued until the fabricated piece was exactly the right length to reach from one level to another. At the time the first joint of each section was lowered into the shaft, a bullet-shaped steel


Hoisting Rope: 1-3/8"
Rope Socket: 1-3/8"
Pin: 2-1/2"
Hook Block: 20-Ton
Swivel
Pins: 2-1/2"
Sleeve: 3/4 x 6", beveled; receives next stand of pipe
Hanger Lugs: 3-1/2 x 6" from 3/4" Plate; Welded to Pipe
Hanger Yoke: 1-1/2" Pins at Corners; Flexibility Provides Easy Coupling to Pipe
Welded Joint: 7 to 12 Beads of Mild Steel Welding Rod (E 6010 AWS). 3/16" Grinnell Backing Ring. Hanger Lugs Removed When Each Butt Joint Passes Collar
Steel Protector Nose Secured by Allen Set Screws; Guides Pipe During Lowering; Prevents Entry of Trash into Pipe; Removed When Pipe Reaches Proper Level
SECTION BEING LOWERED
Sleeve: 3/4 x 6"; Guides Lowering Pipe into Installed Pipe
Water Flow
"T": 12", welded 3 ways; Connects to Flange Fitting
18 x 18 x 2" Square Pl
12" x 30# Channel
24" x 105.9# I-Beam
PIPING PREVIOUSLY INSTALLED IN SHAFT

SKETCH SHOWING METHOD OF INSTALLING WELDED SHAFT-COLUMN PIPE
MORRIS MINE, INLAND STEEL CO
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NO SCALE

The nation's newest perlite crushing-drying-sizing plant at No Agua, New Mexico. The 25 ton per hour capacity plant was designed and built by F. E. Schundler & Co., Inc.

NEW MEXICO'S NO AGUA PERLITE PROCESSED AT SCHUNDLER PLANT

The perlite mining, sizing, and expansion industry is growing at a rapid rate to keep pace with the ever increasing demands for light weight concrete and other perlite products. The growing shortage of structural steel has accentuated the demand for perlite aggregate because its use reduces steel requirements by as much as 50 percent in certain type buildings. In addition to reducing the dead load in concrete-reinforced buildings perlite is fireproof and has superior insulating properties.

Search For Perlite Deposits

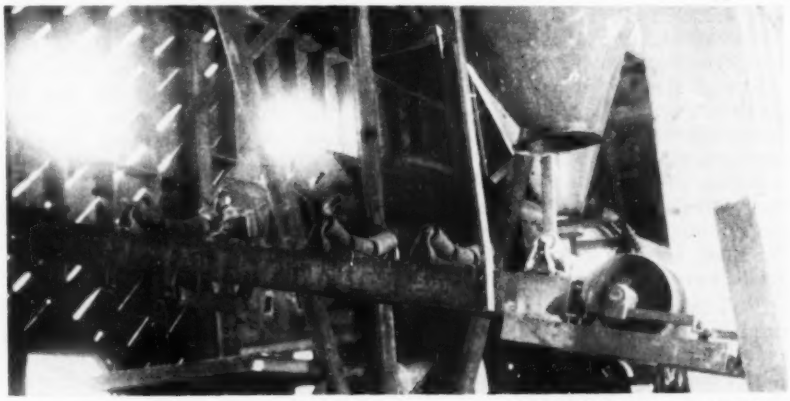
Since the F. E. Schundler & Co., Inc. of Joliet, Illinois and Long Island City, New York has been processing vermiculite aggregates for twenty years, it was natural for the company to recognize the attributes of perlite for certain aggregate uses. For several years F. E. Schundler personally examined scores of perlite deposits throughout the western states. Samples ranging from 100 pound lots to carloads were tested. When samples from the No Agua mountains of northern New Mexico were received in the laboratory at Joliet it was immediately obvious that the search had ended. Several test carloads of material were processed through the Joliet plant and proved to be far superior to all others examined and tested. Upon expansion, it was found to be tough and resilient. The 2,000 acres of claims were surveyed and when the extreme uniformity of the deposit was established, work began on the construction of a complete and modern mill. Carl Schulz, Joliet plant superintendent, designed the plant and moved to Antonito, Colorado to take charge of the erection and installation of the machinery.

M. B. Mickelsen is superintendent of the No Agua operations and will be in full charge of the mining, milling and shipping of the various grades of perlite available from this new plant. He is the original locator of the perlite deposit.

Open Pitting on Mountain Top

The No Agua Mountains rise out of the San Luis Valley plateau and from the top a commanding view is held of the surrounding country for miles in each direction. Mining of perlite is done at the top of these mountains, at an 8,900 foot elevation, by conventional benching methods. A Gardner-Denver 300

Interior view of the plant during construction with the oil-fired drier in the background.



cubic foot compressor is used for drilling. The crude perlite rock upon being loosened by black powder charges is loaded by a Bay City ½-yard power shovel. Eight-yard Ford F-7 trucks with Anthony dump bodies supplied by the Winter-Weiss Company of Denver, Colorado, haul the material down the winding road to the stock pile at the plant.

A D-7 Caterpillar tractor-dozer is used for stripping and for general road work. An International tractor with a Hough front-end loader is kept at the plant for similar activity.

Perlite rock is loaded into trucks by this Bay City ½-yard shovel.

The Perlite Plant

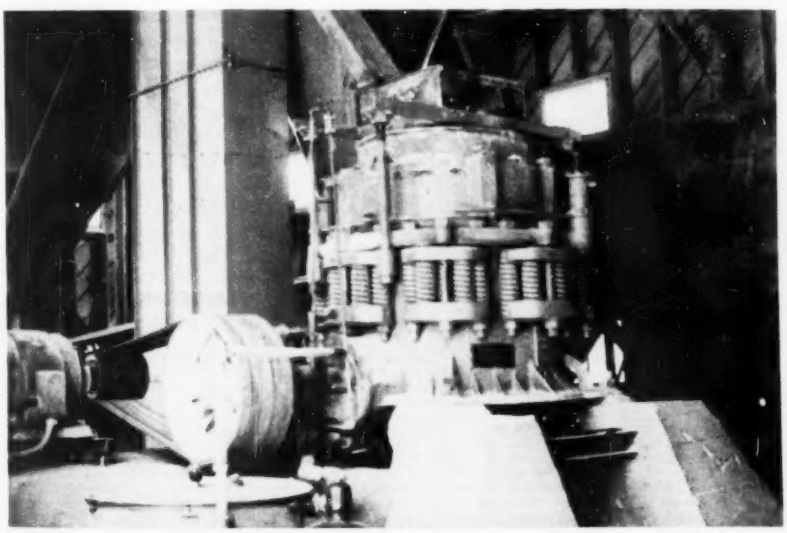
The mill is built at the foot of the mountain of perlite. It has a capacity of 25 tons per hour with all equipment housed in a building 35 feet wide, 104 feet long, and 57 feet high at the screening end.

At the mill the crude perlite is dumped through a grizzley into a Telsmith 14 by 24 jaw crusher, powered by a 25 hp. motor. The crushed product is conveyed by a 12 inch bucket-belt elevator to a 9 by 16 foot Butler Manufacturing Company bin, from which it goes by steel apron feeder to a dryer. This dryer is 66 inches in diameter by 40 feet long, single shell, and is driven by a 30 hp. motor. No. 2 fuel oil is used with a Hauck #783 Oil Burner with 7½ hp. blower. Even in this normally dry country, perlite has some surface moisture and if this is removed more efficient crushing and gradation can be accomplished. Moisture laden air is removed from the dryer by a 6 foot diameter cyclone with a 10 hp. exhaust fan.

From the end of the dryer the ore is lifted by a 14 inch bucket-belt elevator to three W. S. Tyler Company hummer screens. These are 4 by 10 foot double deck, completely enclosed.

The coarse product from these screens is fed through a Symons cone shorthead three-foot crusher made by Nordberg Manufacturing Company. This crusher is powered by a 75 hp. motor.

Because excessive fines are detrimental to a quality product, a 14-foot mechanical air separator made by Raymond Brothers is used to take out the fine material. This separator is powered by a 40 hp. motor. The fines are transported to the dump by an 18 inch belt conveyor, and the finished product goes by a 10 inch bucket elevator to additional Butler bins holding 130 tons each. All speed reducers on the elevators are Dodge Torque arm manufactured by the Dodge Manufacturing Company.



This Symons shorthead cone crusher reduces the primary-screen oversize.

Power And Maintenance

All power for the plant is supplied by a D-397 Caterpillar Diesel-electric generator, 3 phase, 440 volt, 60 cycle, 275 KW. The Diesel-engine is rated at 400 hp. at 8,000 feet elevation. It is a V-12, 1,200 rpm. engine with blower. The fuel tank holding 37,250 gallons of fuel oil with pump feed is located a safe distance from the main buildings.

A complete repair shop has been installed in the power house including a gasoline-electric Hobart arc welder of 300 amp. capacity. Lights for the plant, when the Diesel is not operating, are supplied by a Wisconsin gasoline engine driven 6 KW. light plant.

Shipped From Antonito

The perlite aggregate is hauled from the mill bins to the railroad shipping point just outside of Antonito, Colorado. Storage bins with a capacity of 180 tons have been built at the railroad. The perlite, as dumped from trucks, can be loaded directly into box cars by a conveyor or elevated to the top of the bin.

Carload shipments of perlite aggregate are made to expansion plants at Joliet, Illinois; Long Island City, New York; Metuchen, New Jersey; and West Des Moines, Iowa.

At De Kalb, Illinois the Schundler Company manufactures acoustical tile and a high temperature block insulation with No Agua perlite being one of the principal ingredients. It is also being used as an additive to certain types of paint and lacquers; in foundry sands and as a filtration aid.

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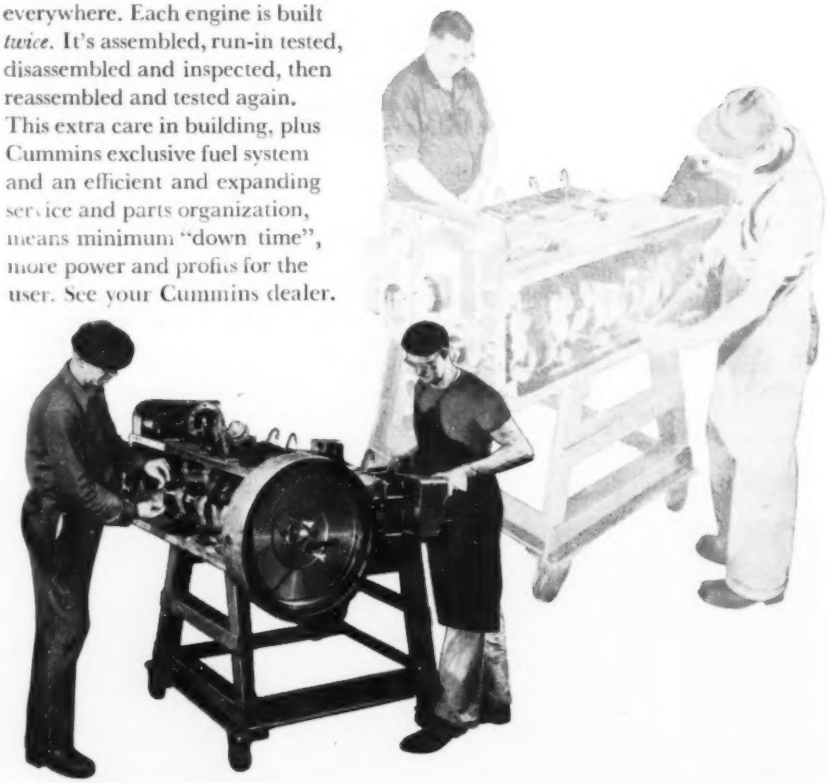

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(10-8R1)

NORTHWEST'S RECORD CONVENTION

The Northwest Mining Association's 57th Meeting Featured Materials Handling, Government Relations, Sunshine Mine, and Metals Future

A bright future for mining was prophesied by speakers from Canada and the United States at the 57th annual convention of the Northwest Mining Association in Spokane, Washington on November 31 and December 1, 1951.

Continuation of great metals demand and high prices, as compared to the last 10-year average, was specifically forecast for copper, lead and zinc. The recent decision of the International Monetary Fund to withdraw its official objection to the sale of industrial gold (22-carats) was termed the "first step toward emancipation of the gold miner."

The future of minerals technology in the next 10 years was outlined by Dr. J. R. Van Pelt, president, Montana School of Mines, when he stated that new mining developments would be based on research and that, "the alertness of the mining industry imposes no limit on what can be done." He listed the most important developments in the last 10 years in the major branches of mineral technology as follows: *Search for ores;* geochemical prospecting and the airborne magnetometer. *Mining;* continuous coal miner, rock bolting, detachable bits, tungsten carbide bit inserts, and trackless mining. *Metallurgical concentration;* the Humphreys spiral classifier and mechanical classification. *Extractive metallurgy;* recovery of magnesium from sea water, and the pressure and oxygen blast for steel blast furnaces. *Physical metallurgy;* the alloys of aluminum and magnesium, and methods to produce titanium and beryllium. In closing his address, given at the opening luncheon sponsored by the Columbia Section of the AIME, Dr. Van Pelt said, "the future depends on young men. The mining industry must attract young men. It needs men with deep respect for hard work, faith in its rewards, occupational integrity and capacity for growth."

Zinc Price For Production

In the opening speech of the convention, W. G. Wolff, Wallace, Idaho, superintendent, electroylitic zinc refinery of the Sullivan Mining Company, told the more than 500 miners from Washington, Idaho, Montana, Oregon and British Columbia that "a guaranteed zinc price for a stipulated period and/or tonnage—would be most beneficial for augmenting zinc production." As for the future of zinc and the price of zinc, he added, "zinc is a basic industrial commodity; it is essential in our economy, and will therefore tend to rise and fall with the general overall economy—all this provided that the free flow of supply and demand, unimpeded and free from government's restraint, is allowed to function. For the long pull, I have no fear for zinc, but for the near future I prefer that you look into your own crystal ball."

The "World Lead Situation" was outlined by F. L. Hallam, assistant comptroller, The Consolidated Mining and Smelting Company of Canada Limited, Trail, British Columbia. He said that there were two schools of thought concerning lead. The first was pessimistic and believed that present production was severly taxing the world's reserves and that no new major lead discovery had been made in the last 25 years. However, the optimists believe that deeper mining, profitable mining of lower grade ores, and continuing exploration in known districts will keep pace with production for a long time. He scored governmental "planned economy" and a belief that price regulations and international controls would solve all lead supply and demand problems. "Price fixing and governmental intertrading equals organized scarcity," was his report.

Government aid, including tax relief, may be required and is often necessary to develop newly discovered lead deposits and is "right and proper," he continued. Speaking of prices, he believed that, for the next two to three years, the existing lead price level might continue, but that while today's price may not hold over the long-term future lead should be higher priced than the last 20-year average.

Copper and Gold

E. R. Marble, manager, Tacoma, Washington, smelter of the American Smelting and Refining Company, outlined the disparity in the world copper prices and noted that the closer the copper got to the iron curtain the higher priced it became. Despite the lowest price in the world for copper received by United States producers they were doing everything practical to produce every pound of copper.

Charles H. Mitchell, editor, *Western Miner*, Vancouver, British Columbia, reported that gold mined in Russia was an important economic weapon and that the Soviets had

E. C. Stephens (LEFT) was reelected president of the Northwest Mining Association. He is a geologist for the Anaconda Copper Mining Company. J. C. Kieffer (RIGHT) is the newest vice president of the association. He is general manager of the Spokane-Idaho Mining Company's Coeur d'Alene mining properties.

A wide range of subjects were discussed by these four speakers, from left to right they are: A. E. Weissenborn, United States Geologic Survey who spoke on DMEA exploration; Lynn Kinney, mine superintendent, Pend Oreille Mines & Metals, Inc. who told of materials and ore handling in inclined shafts; Wallace G. Woolf, superintendent of the Sullivan Mining Company's zinc plant opened the convention with an address on zinc; and William Love, superintendent, Hecla-Atlas project, Sullivan Mining Company who gave a report on "Materials Handling in Mine Yard and Shaft."

bought wool on the world market at a very high price and paid for it with gold. He reported that many gold-buying brokers were active in Canada and that competitive bidding in Toronto had resulted in sales at $39.27 per ounce—the highest price ever received for newly mined Canadian gold.

Materials Handling

One technical session was devoted to "General Materials Handling in Yard, Mine and Shops" and was one of the finest materials, handling sessions ever presented as evidenced by the loud praise of the many mine operators in attendance. Roy S. Hooper, assistant mine superintendent, Bunker Hill & Sullivan Mining & Concentrating Company, was the chairman. He divided the program into two parts: methods applicable and used in vertical shafts, and those used for inclined shafts.

William Love, superintendent, Hecla-Atlas project, Sullivan Mining Company, reported on the advance stage of mechanized materials handling reached by Hecla Mining Company. The system of fork lift and roll jaw lift trucks has eliminated the use of service track in the timber yard with the resultant ease of snow removal. Love emphasized the need for a good solid surface on which to operate the lift trucks and said that they could be used economically by small mines.

Arthur Nelson, assistant plant superintendent, Morning mine, Federal Mining Company, reported that dimension timber formerly handled eight times by hand was now packaged and bound by standard slings for transportation to the far reaches of the deep Morning mine. Separate slings are used for head boards and the longer lagging, but the principal was the same. By means of scale models, he demonstrated how timber was unloaded from trucks in the mine yard, transported to the shaft collar, loaded on the cages, and unloaded underground. The advantage of the sling method is the fact that it can be adapted to existing equipment at established mines.

Inclined Shafts

Robert Haffner, assistant mine foreman, Bunker Hill & Sullivan Mining & Concentrating Company, outlined the "Improved Timber Handling at Bunker Hill." He outlined the mechanization now used from Bunker Hill's own sawmill to the stope face in sawing, bundling, banding, storing, transporting underground, and lowering of timber down the 41° inclined shaft. Only one man is needed for loading and one man for unloading the bundles from the skips. All rail, pipe, and other mine supplies are banded and handled as a unit-package. Special "tote" boxes are used for kegs of nails, powder, cement, and other mine supplies. He said that "the use of the fork lift truck can not be underestimated and new uses are being found for it everyday."

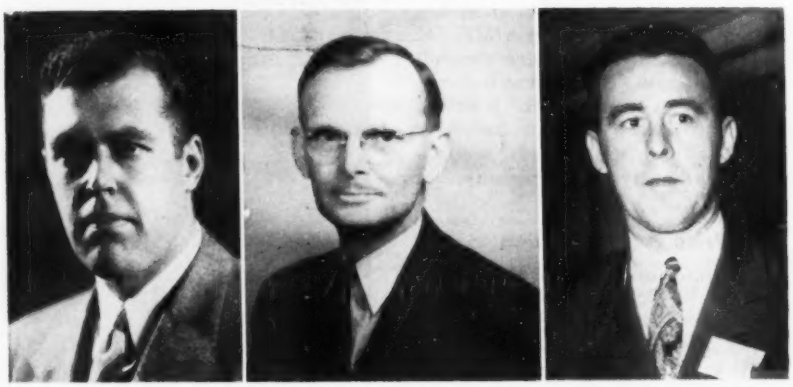
Lynn Kinney, mine superintendent, Pend Oreille Mines and Metals, Inc., reported on "Material and Ore Handling In and Out of an Inclined Shaft." The Pend Oreille shaft having an incline of only 17° and 10° presented a much different problem in materials handling. Supplies and equipment are transported to and from mine levels on special skips mounted on four rubber-tired passenger car wheels. Each skip is equipped with a guide roller on each corner.

The Sunshine Mine

The Sunshine mine of the Sunshine Mining Company in the Evolution mining district of the Coeur d'Alene was the subject of a symposium presented by the Company and its employees as the first technical session of the convention. Ross Leisk, general manager, presided at the session and lead the discussion and questions following the four staff-prepared and presented papers. The first paper, "History of the Sunshine Mine," was read by R. L. Anderson, chief engineer. He outlined the trials and hard work of the early miners and how the company has grown to one of the world's greatest silver mines with total production from 1904 through October 1951 of 4,273,429 tons of ore, from which 132,664,769 ounces of silver were recovered. Dividend payments are $29,969,969 from smelter returns of $97,801,652.

Raymond F. Robinson, chief geologist, reported on the geology of the

Paul B. Jessup, (LEFT), vice president, Day Mines, Inc. reviewed the Internal Revenue Act of 1951 and its effect on the mining industry. Rowland King, (CENTER), field engineer, Sunshine Mining Company outlined the manganese supply and demand situation. C. E. Schwab, (RIGHT), mining engineer, Bunker Hill & Sullivan Mining & Concentrating Company reported on the final stage of the 1951 labor negotiations.



Left to right are: Frank N. Marr, general convention chairman and president of the Spokane-Idaho Mining Company; and session chairman; C. A. R. Lambly, mine superintendent, Pend Oreille Mines & Metals Company; Ross D. Leisk, general manager, Sunshine Mining Company; and Wray D. Farmin, director, Day Mines, Inc.

Sunshine mine, and reviewed the ore-bearing structures; he told in detail of the recent study of hydrothermal alteration and vein carbonate minerals in the "Silver Belt." The study showed indicator minerals were lacking and that bleaching was due to a more complex change than was formerly recognized. Favorable features for ore shoots seem to be as follows:

1. "Wallrock environment of bleached alternating thin beds of quartzite and argillite with individual thicknesses of two inches to two feet.
2. Beds crossed by ore-bearing structures at low angles on strike except where the fracture is mineralized, and forms a short link between two faults.
3. Intersections of diverging or converging veins, faults, and shears.
4. Cross-fault intersection with veins usually accompanied by enrichment or ore values.
5. Flexuring of veins on strike and dip. Ore favors steep portions of the veins and areas of maximum curvature along the strike, but there are definite exceptions to this."

Sunshine Uraninite

Robinson next gave a detailed report on the Sunshine Uraninite occurrence. It is found in areas where there is a definite red wall rock alteration. This alteration "was caused by silicification and recrystallization of the wallrock accompanied by the deposition of fine-grained red hematite." To date, the uraninite has been found to be of uneconomic importance, but "might have some significance in the case of dire national emergency."

H. B. Johnson, production engineer, gave an illustrated talk on "Production Grade Controls at the Sunshine Mine." A detailed record of each stope is maintained and plotted on a master chart. When a stope is found that is not paying, the engineering department checks the stope with the foreman and many times cleaner mining or narrower mining will bring it back to a paying status. The main reasons why a stope cannot be mined at a profit generally are fringe mineralization areas, barren vein areas, and too narrow a vein.

Continued on Page 93

1951 Declaration of Policy Of The Northwest Mining Association

We, the members of the Northwest Mining Association, do hereby pledge to our country the fullest use of our productive capacity to the end that we may deliver the maximum possible amounts of the metals and minerals needed for National defense and essential civilian use.

MANPOWER: In order to maintain maximum productivity, it is essential that the mining industry be protected from the loss of skilled and experienced manpower which assumed such disastrous proportions in World War II.

LABOR-MANAGEMENT RELATIONS: There is immediate need for adequate legislation to prevent the undermining of our economy through communistic control of labor unions.

GOVERNMENT EXPENDITURES: The costs of the emergency and of essential functions of government should be met adequately, honestly and fairly, without waste and extravagence.

TAXATION: In the last year, three new taxing acts have imposed sixteen thousand million dollars in additional taxes. Non-essential spending must be eliminated if we are to survive.

STOCKPILING: We favor stockpiling of metals and minerals essential for defense and emergency needs, but we believe stockpiles should be accumulated in periods when production exceeds demand and that stockpiling should be suspended during periods when the production of metals is insufficient to meet the demands of essential industries.

TARIFFS: We recommended that Congress exercise its authority over tariffs to be administered to maintain the living standards of the American people and to provide when necessary reasonable protection to our essential industries against the competition from low foreign wages and depreciated currencies.

MINE FINANCING: The development of our mineral resources by private capital is the American way in a free society and every effort should be made to remove unnecessary handicaps and restrictions to the flow of venture capital essential to the search for, and development of mineral deposits.

PUBLIC LAND POLICY: We oppose any basic changes in our mining laws at this time, and in particular to the proposals to deny the locator or mineral patentee full rights to the use of the surface of his mining claims for mining purposes.

We are unalterably opposed to suggested changes that would in effect, deprive the mine locator of his property and his day in court upon the bare accusations of local administrators whether or not supported by competent evidence.

GOLD, SILVER, AND MONETARY POLICY: We believe in a currency with the traditional base of gold and silver. A currency not backed by gold and silver invites unrestrained deficit financing, waste, and careless acceptance of committments impossible for future generations to meet without ruinous inflation. We urge the removal of all restrictions upon ownership and sale of gold by American citizens and corporations.

We advocate Congressional action to recognize the increased cost of producing silver by limiting the seigniorage charged by the United States Treasury upon newly mined domestic silver to one percent of the coinage value instead of 30 percent as at present.

GOVERNMENT MINERALS PROGRAM: We urge Government agencies which have assumed authority to regulate the mining industry during the emergency to: 1. Assure stable metal prices for a sufficient time to stimulate mine development and warrant the expenditures necessary to increase production. 2. Afford to domestic mines at least the same price and other considerations and advantages given to foreign producers. 3. Take into consideration the fact that present ceiling prices in some instances prevent the maintenance and expansion of domestic mineral production.

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Power shovel loading blasted copper ore in the Chuquicamata, Chile, open pit mine of the Chile Exploration Company, an Anaconda subsidiary.

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Butyl Insulation for higher dielectric strength and resistance to moisture; for less damage by heat and compression.

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Special Features of Type SH-D Securityflex Shovel Cable are its patented non-kinking rubber-cored ground wires that provide large contact area with the conductor shield; the copper-cotton conductor shield that eliminates chafing failures, greatly simplifies splicing.

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Muriel Sibell Wolle Describes

ANIMAS FORKS IN THE SAN JUANS

High in the San Juans, near the head of the Animas River is the old mining town of Animas Forks. It is now more than forty years since the dropping of the hundred stamps of the Gold Prince mill made a "din and rumble like distant thunder" through the camp and it is nearly as long since puffing engines pulled trains up the steep grade from Eureka, four miles below, and since Otto Mears superintended the building of snowsheds to protect the tracks at bad slide areas.

The mines in the district were first worked in 1875, when a mill was erected at the Forks to treat ores brought down from the Red Cloud mine at Mineral Point, higher still in the mountains. The miners in the meantime pitched their tents in the dense timber which covered the future townsite, and as more properties were developed and more men moved in, the tiny camp became lively.

The townsite of Animas Forks, with its one principal street was laid out in 1877. Lots were free to anyone who would "locate and build, parties selecting according to their own free will and choice." There was access to Lake City (then more important than Silverton), by way of Burrows Park; and with the completion of the Henson Creek and Uncompahgre toll road via Mineral Point, a new and shorter route was opened to the outside world.

By 1877 several large mining companies—the Animas Forks, the Sioux City, the Graham Silver and the San Juan—were located in the rapidly growing district. The San Juan Works was the first to be destroyed. During several successive days in March, 1877, "more than a foot of snow fell every 24 hours." Finally, without warning, a snowslide started two miles above the San Juan Smelting and Refining Works and "like a vast tidal wave with a breast of nearly 150 feet, struck the northwest corner of the main building squarely, sweeping it together with the smelter, the large sawmill and three cabins from 15 to 20 rods across the river. Not a trace is left at the old site. . . . The whole wreck (entailing a loss of $30,000) seems to have been shot like a rifle bullet into the opposite hill."

Snow was always a menace at the Forks. Even as late as June the road was often still closed to teams between the Forks and Eureka because of several large slides which blocked it. But though teams might be stalled the miners could get about on skis. According to the *Ouray Times* of Feb. 7, 1880, "Animas Forks is the business center of Mineral Point and Poughkeepsie Gulch and always shows life, even in midwinter. Sundays are always lively days. The miners come sailing down from the timberline peaks to the snowbound village, eager to get their mail and have a chat with neighbor miners on sunny sides of buildings; and around social card tables, mines and new mining enterprises are talked over . . . newspapers devoured and their contents thoroughly digested."

By 1881 the Forks was spoken of as the "pivotal metropolis of the numerous camps which surround it," and it boasted that it was "without doubt the largest town in the United States at an alitude of 11,300 feet. Mineral Point may be higher but it is not so large." A ball given in the eighties was described as a "most creditable affair for this elevated mining camp." Even its 20-mile telephone line from Lake City crossed the divide at a point 12,500 feet above sea level.

As the camp grew, a dozen business houses and two assay offices were opened to serve the "thousand miners and citizens" who used it as a center. The miners must have been a hardy lot for "there has not been a death in camp, and since there is but one cemetery in the county it looks very lonesome," wrote a correspondent to the *Lake City Mining Register* on Jan. 1, 1881. Crofutt, in his *Gripsack Guide* visited the camp the same year and was less impressed with it. He said: "It is a wild and rugged country where nothing but rich mines would ever induce a human being to live longer than absolutely necessary."

When the miners at the Forks ruled that patent notices of mining claims should be published in the nearest newspaper, Sol Raymond moved his plant there and printed the first sheet. He called it the *Animas Forks Pioneer* and sold the first copy for $500 to Bill Young, owner of the Bill Young claim at Mineral Point. Every copy of that issue brought at least a dollar, and many sold for as much as $25. As long as prospectors staked new mines, the paper flourished, but by 1886 subscriptions and patent notices fell off and the paper folded up.

A few of the buildings still standing in Animas Forks.

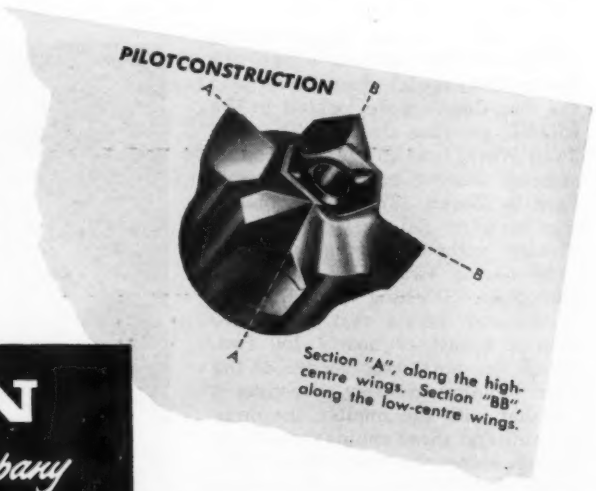
Ready for extra-ordinary service and easier warehousing. These Liddicoat Rock Bits will follow millions of others to many of the world's outstanding mining and contracting concerns operating in the 11 western states, Alaska, Mexico and the Philippines.

LIDDICOAT detachable rock bits are not ordinary in any sense of the word. Many outstanding features of manufacturing and processing of the fast-drilling LIDDICOAT bit add to its dominant position in the mining and contracting fields.

LIDDICOAT bits are *used to destruction . . . no resharpening.* This alone is an *extra*, out of the ordinary feature providing excellent performance and service. LIDDICOAT eliminates costly labor and equipment necessary for re-sharpening, heat-treating and transporting.

LIDDICOAT bits are designed to give fast-cutting performance and long-cutting life at a low initial cost per bit and lowest cost per foot of hole drilled. Add to this, special LIDDICOAT strength and superiority of attachment, consistency and hardness of the specially rolled steel which is forged into tough bits, and you have many of the *extra* ordinary features of LIDDICOAT, the fast-drilling detachable rock bit.

Put that *extra* quality to work in your drilling operations and you too will join the ever-expanding list of the worlds' leading mining and contracting concerns who are now satisfied LIDDICOAT customers.



Section "A", along the high-centre wings. Section "BB", along the low-centre wings.

WESTERN
Rock Bit Manufacturing Company
552 West 7th South • Salt Lake City 4, Utah

"EVERY LITTLE BIT COUNTS"

As more and more timber was cut from the hillsides above the town, the town was endangered by snowslides.

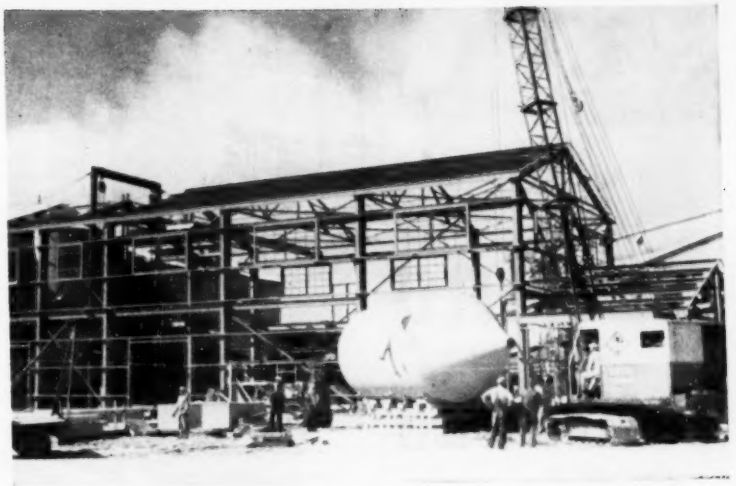
One slide came down Wood Mountain, jumped across Animas canyon and buried John Haw's cabin in 50 feet of snow. The slide burst in his door and filled the cabin in a moment. After three hours he succeeded in digging himself out. During the winter 25 feet of snow fell at the Forks, no cabin was safe from December to March; and although sleighing was good all the way to Eureka, riders were always in danger.

In 1882 the Eclipse Mining and Smelting Company reopened its plant. This gave the Forks and Mineral Point a local market for ore and there was talk of adding another blast furnace to the smelter if the amount of ore handled warranted it. At that time the Lily, and Golden Eagle mines were producing brittle silver and the Golden Fleece in Picayune Gulch, two miles from the Forks, was yielding paying ore.

A railroad spur from Eureka to the Forks was built by Otto Mears in 1903 on the bed of the roadway he had previously built between the two towns. This enabled the mines to ship more easily and economically but after 1920 the road did not run beyond Eureka and all hauling was done by truck. Lately the tracks have been torn up all the way to Silverton.

The biggest mining property was that of the Gold Prince at the head of Mastoden Gulch. The group of mines was located on the Mastoden vein and was known as the Sunnyside Extension at the time that Rasmus Hanson sold it to the Gold Prince Mines Company in 1903. At the time the property was acquired a 30-ton mill stood on the site. Production up to that time had been only from the upper levels of the mine and most of the ore was high grade. The new owners proceeded to build the biggest concentrating plant in the state—a 500 ton mill measuring 336 by 184 feet. Work was started on it and on the construction of a 12,600 foot long Bleichert tramway, which was to connect the mine with the mill, on July 1, 1905. Workmen on the project lived in a tent city until a large boardinghouse was built for their convenience.

The Gold Prince Company held sixteen claims; it was capitalized at $3,000,000 and it was fortunate in having for its manager W. Z. Kinney, formerly manager of the Gold King mine at Gladstone.



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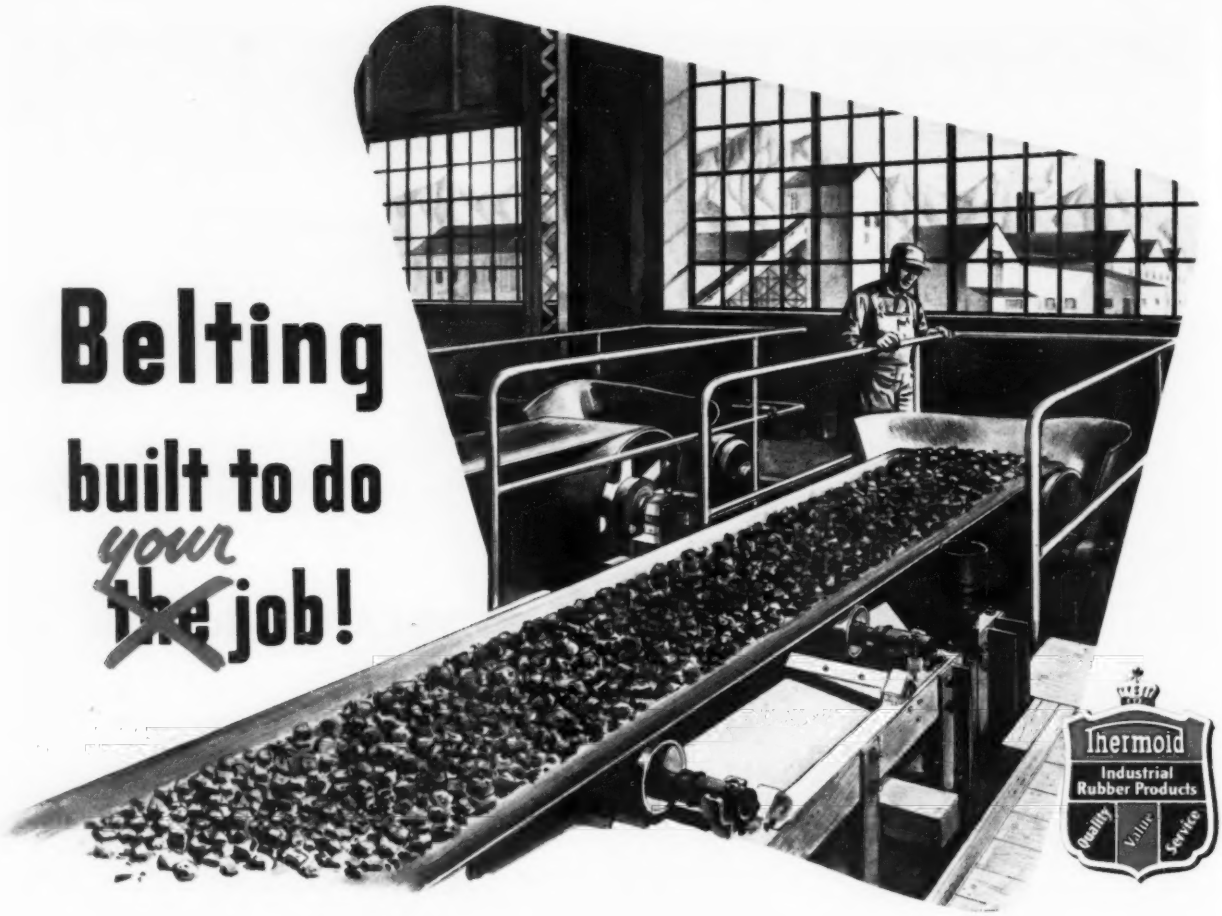

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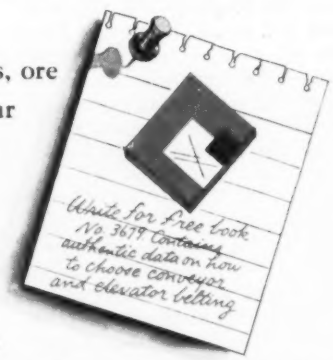

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ACTIVITIES OF U. S. MINING MEN

ARTHUR F. PETERSON, vice president, mining division, Bethlehem Steel Company, will be honored when Puritan Mining Company (Pickands, Mather & Company, operating agents) names its extensive new operation on Michigan's Gogebic Range the "Peterson Mine." Mr. Peterson was actively connected with mining operations on the Gogebic Range until 1924 when he was engaged by Bethlehem as general superintendent at the Cornwall mines in Pennsylvania. He was promoted to general manager of this operation in 1927, and in 1946 became general manager of Bethlehem's mining division. The group of properties to be known as the Peterson mine consists of what were formerly the Puritan, Ironton, Yale, and Colby mines.

Dr. Grover C. Dillman, president of the Michigan College of Mining and Technology, will be the guest speaker at the meeting of the New York section of the college's Alumni Association, held in conjunction with the Annual Meeting of the AIME at the Statler Hotel in New York City, February 19.

Harry S. Peterson, general superintendent, Jones and Laughlin Ore Company, Michigan operations, has retired after 45 years of service. He will continue to serve the company in a consulting capacity. **Robert W. Braund,** formerly assistant general superintendent of the same operation, succeeds Mr. Peterson.

Frank W. Chambers, Koppers Company officer, has been named director of engineering for Kennecott Copper Corporation. **S. R. Zimmerley** has been appointed director of research for the Western Mining Divisions of Kennecott. He was formerly chief of the Metallurgical Branch, Region IV, of the U. S. Bureau of Mines.

Earl Holmes has been promoted from assistant superintendent to mine superintendent at the Soudan mine of the Oliver Iron Mining Company, Vermilion Iron Range, and **George Nemanich** has been named mining captain. **John V. Kochevar** is now underground foreman at the Frazer mine.

Robert H. Sayre, Jr., is mine superintendent for the Minerals Engineering Company. He is in charge of uranium-vanadium mining operations at Temple Mountain, Utah, for the company, with office headquarters at Green River, Utah.

Dale Lanphere has been elected to the board of directors of General Mines Corporation, which is developing a property on Little Pine Creek in northern Idaho's Coeur d'Alene mining region. He is vice president of Ambassador Mines, a Montana operating firm.

Tom Lyon, director of Defense Materials Procurement Agency, is chairman of an Industry Advisory Committee to the Agency. Among those attending the first meeting were: **W. L. Zeigler,** Pend Oreille Mines and Metals Company; **Joseph H. Taylor,** vice president, Peru Mining Company; **Edward W. Snyder,** Combined Metals Reduction Company; **Elmer Isern,** Eagle-Picher Mining and Smelting Company; **J. H. Buchanan,** Nellie B. Mining Company; and **W. H. H. Cranmer,** New Park Mining Company.

Samuel W. Anderson, former program vice chairman of the War Production Board in World War II, has been named deputy DPA Administrator for Aluminum. In his new capacity, he will be in charge of assuring a supply of aluminum to meet defense and essential civilian requirements.

L. A. Roe has been appointed director of the mining and metallurgical section of the Bjorksten Research Laboratories, Inc. at Madison, Wisconsin. He was formerly technical supervisor of ore research for the Jones and Laughlin Steel Corporation.

Dr. D. H. Reynolds is now director of research for Chapman and Wood, consulting mining engineers and geologists at Albuquerque, New Mexico. Dr. Reynolds is a former director of research for the University of New Mexico, and has conducted research studies for Monsanto Chemical Company.

W. H. H. Cranmer, president and general manager of New Park Mining Company, has been elected president and director of Tennessee Metals Corporation. He succeeds **Ralph Langley** as president.

R. J. B. LaBell has resigned as chief metallurgist of the Copper Range Company at Houghton, Michigan, and is now assistant manager of the Jones and Laughlin Ore Company division of ore research at Negaunee, Michigan.

Jack H. Dressel is engineer for the Front Range Mines Company at Victor, Colorado. Before joining Front Range, he was employed by Climax Molybdenum Company at Climax, Colorado.

ADMIRAL BEN MOREELL, president of Jones and Laughlin Steel Corporation, and CHARLES E. WILSON, defense mobilization chief, are shown just before they gave the signal for tapping the first 250-ton heat of steel at J&L's new open hearth furnace at Pittsburgh. The furnace is one of eleven that J&L will have in operation in its new $70,000,000 open hearth shop by March. Total annual capacity of the furnaces is 2,000,000 tons of steel.

JOHN J. FORBES has received a recess appointment as Director of the U.S. Bureau of Mines, succeeding James Boyd who has resigned. Mr. Forbes has been with the Bureau for 35 years, and is considered an expert in the field of mine safety. He has been chief of the Health and Safety Division since 1948, and served previously as chief engineer of the Safety Extension Service, chief inspector of the Coal Mine Inspection Division, and chief engineer of the Mineral Production Security Division.

James B. Love is employed at Grand Junction, Colorado, as laboratory technician for the Climax Uranium Company. He was graduated from the Colorado School of Mines in 1951.

J. Bruce Clemmer of Tucson, Arizona, was named chief of the United States Bureau of Mines' Intermountain Experiment Station at Salt Lake City, and head of the Metallurgical Division in Region IV. Mr. Clemmer has been with the Bureau since 1929. Since 1945 he has been chief of the Southwest Experiment Station at Tucson. In his new post he will direct all metallurgical activities of the Bureau in Utah, Wyoming, Colorado, New Mexico, and Arizona.

Chelsea R. Phillips has become field engineer for Robins Conveyors division of Hewitt-Tobins, Inc. and will devote all of his time to the iron mining in the Lake Superior region.

Stuart Bradley, mining engineer in the Duluth offices of the Oliver Iron Mining Company, has been appointed supervisor of ore reserve estimates for the company.

Lowell B. Moon, chief of the Minerals Division of the U. S. Bureau of Mines, resigned to accept a position in the exploration department of Kennecott Copper Corporation. **Dr. James Boyd** of Kennecott's exploration department has been in Paris conferring with officials of the Economic Cooperation Administration concerning mine exploration and development projects, with special reference to Africa.

Paul Zinner, former director of Region V, has left Minneapolis for Washington, D. C. where he is now acting chief of the Minerals Division of the U. S. Bureau of Mines. **Paul H. Alsman,** former chief mining engineer of Region IV, has been promoted and is now acting director of Region V.

J. C. Noyes of the Diamond Magnesium Company, Painesville, Ohio, was one of those representing industry at a recent meeting of the Primary Magnesium Producers Industry Advisory Committee. Others attending were **J. C. H. Stearns,** Ingot Sales, Magnesium Division, The Dow Chemical Company, Midland, Michigan; **Ralph E. Knight,** Kaiser Aluminum & Chemical Corporation, Oakland, California; and **E. H. Monroe,** Pacific Northwest Alloys, Inc., Spokane, Washington.

Edgar Kaiser has been elected a member of the board of directors of Kaiser Aluminum & Chemical Corporation, Oakland, California, and **William P. B. Marks** has been elected vice-president and secretary. They fill vacancies created by the death of **G. G. Sherwood.** Mr. Kaiser is president of Kaiser-Frazer Corporation, while Mr. Marks is vice-president in charge of the legal department of Henry J. Kaiser Company.

Howard P. Eels, Jr., president of Basic Refractories Incorporated, Cleveland, Ohio has accepted membership on the Mackay School of Mines advisory committee.

Roy A. Bowen, Montreal, Wisconsin, was named general superintendent of Montreal Mining Company. He has been assistant superintendent and superintendent of Montreal, and since 1943 has been in charge of operations of the Montreal mine, the largest underground iron ore producer in the Lake Superior region.

Clarence A. Bjork has been appointed superintendent succeeding Mr. Bowen. He has been with the company since 1927. **Charles F. Guenther** has been appointed assistant superintendent to succeed Mr. Bjork. **Thomas P. Rowe** was appointed head mining captain and **John Stenman** was appointed assistant to the of Montreal mine, while William S. Baxter has been appointed assistant to the superintendents of Montreal.

Wallace B. Quail of Middletown, Ohio, has been appointed director of the Iron and Steel Division of the National Production Authority. He is currently on leave from his post as manager of the Central Area for Armco Steel Corporation. In his new position, he succeeds **Richard F. Sentner,** who has returned to Pittsburgh to resume his duties as Assistant Executive Vice President of the U. S Steel Corporation.

Norman A. Moberg, mining engineer with the Oliver Iron Mining Company in the Duluth office, has been promoted to supervisor in the company's mining engineering division there. **Everett Johnson** of Coleraine, Minnesota, has been transferred from the Canisteo district to the mining engineering department in Duluth. **John C. Howbert,** formerly a mining engineer in the Canisteo office, has been appointed assistant chief engineer of the company's Gogebic range mines. **Richard Strong,** geologist, is now located at the Ishpeming office.

Clyde M. Pearce, Jr., mechanical engineer, has been transferred from the Bennett mine of Pickands Mather & Company at Keewatin, Minnesota, to the firm's office in Duluth. **Neal E. Walker** of Lansing, Michigan, has joined the staff at Crosby, Minnesota, as geologist.

A. P. Bashore and **Donald Deckert,** both of Pottsville, Pennsylvania, have been surveying the mine holdings of the family of the late **Philip Brenneman** in Ross Basin, near Silverton, Colorado. The Brenneman holdings were leased by the Sunnyside Mining and Milling Company for a number of years.

H. H. Vaughan, chemist, is a new recruit at the Jones and Laughlin Ore Company research laboratory in Negaunee, Michigan. **Donald S. Skufca,** mining engineer, has joined the company's engineering department in Ishpeming.

Raymond B. Holbrook, attorney for the U.S. Smelting, Refining & Mining Company, has been appointed chairman of the Advisory Council of the Salt Lake City Chamber of Commerce.

John D. McIver is lead man in the tank house of Kennecott Copper Refining Company in Magna, Utah.

H. E. Risser is serving as Instructor in Mining at the University of Kansas while doing graduate work.

Elmer Isern, president of The Eagle-Picher Mining and Smelting Company, and **K. E. Kimmel,** assistant secretary, have been elected vice president and assistant secretary, respectively, of The Eagle-Picher Company. **Miles M. Zoller,** manager of the Pigment Division of The Eagle-Picher Company, has also been elected a vice president of that company.

Obituaries

Donald A. Callahan, 76, former Idaho State senator and long a prominent figure in the mining industry, died in a Los Angeles hospital October 26. He had been attending the American Mining Congress Convention for which he was chairman of the resolutions committee. He was president of the Callahan Consolidated Mining Company and the Eastern Lead Company.

Walter P. Carroll, 59, a vice president and director of the National Lead Company, died in Hinsdale, Illinois October 20. He was manager of the company's Chicago branch and of its metal department. He had been with the lead company since 1910.

Raymond Charles Force, 71, first president of the Caterpillar Tractor Company and a member of its board of directors, died in Oakland, California November 15.

Ernest B. Erickson, 73, died in Crosby, Minnesota November 2. He had been in charge of the Lerch Brothers Incorporated Laboratory for many years, and had just completed his fiftieth year with the company.

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ACTIVITIES OF INTERNATIONAL MINING MEN

Franklin E. Turton has been elected a vice president of Braden Copper Company, a subsidiary of Kennecott Copper Corporation. Mr. Turton has been with Braden in Chile for 38 years, having started as a young mining engineer. For the past seven years he has been general manager, the chief executive of Braden in Chile. He has been a director since 1946.

Karl V. Lindell has been appointed vice president of Canadian Johns-Manville Company, Ltd. and general manager of the company's Asbestos Fibre Division. As general manager, Mr. Lindell will succeed **A. R. Fisher** who, in addition to being president of the company, has also been acting as general manager. Mr. Lindell has been mine manager of the company's Jeffrey mine in Quebec.

J. J. Young has been promoted to general mine superintendent of the Raub Australian Gold Mines Ltd. at Raub, Malaya.

Ron Quirk has left Peru and is now in Australia conducting some mine examination work for the National Lead Company.

Karl Gustaf Sandstrom, mining engineer, has been appointed managing director of the Svenska Aluminiumkompaniet (Swedish Aluminum Company).

F. M. Fisk, an Australian drilling expert has signed a five-year contract with the Indian Government to step up geological research in India. He will be in charge of boring operations and will advise the Drilling, Mining, and Rare Minerals Section of the Geological Survey of India on technical matters.

G. S. Lee has been appointed honorary secretary of the West Australian Institute of Mine Surveyors.

Count Carlo Faina, president of the Italian Mining Association and vice president of Montecatini Company, and **Giovanni Falck,** vice president of the Italian Iron and Steel Association and president of Falck Steel Mills, were among those members of the Italian delegation attending the "Productivity Congress" which met in New York in December. The congress was sponsored jointly by the United States Economic Cooperation Administration and the National Association of Manufacturers.

H. R. Sheppard has been appointed vice president and manager of Huggard Equipment Company's mining department, Winnipeg, Canada. Mr. Sheppard was with Kipp Kelly Limited before joining Huggard.

Arthur F. Taggart has retired as Professor of Mineral Engineering at Columbia University, School of Engineering, in New York City. He is author of *Handbook of Mineral Dressing* and many other technical publications. **M. D. Hassialis,** former associate professor in the mineral engineering division, will succeed Professor Taggart. **Nathaniel Arbiter** of the Research Department of Phelps Dodge Corporation will be made associate professor, and **H. H. Kellogg,** formerly assistant professor, has been promoted to associate professor of mineral engineering at Columbia.

GEORGE R. SCHAEFER has been appointed general manager of Minas de Matahambre, Pinar del Rio province, Cuba. Mr. Schaefer has been with the firm since 1936, serving as junior engineer, mine foreman, assistant mine superintendent, mine superintendent, and assistant general manager. He received his B.S. degree in mining engineering from Lafayette College in Easton, Pennsylvania.

John E. Bowenkamp has returned to the United States from Colombia, South America and is now employed by the Freeport Sulphur Company in its New York, New York office.

Dr. Herbert W. A. Sommerlatte, formerly mines manager of The Metal Corporation of India, Ltd., Zawar Lead-Zinc Mines at Udaipur, Rajasthan, India, has joined the staff of the London and Scandinavian Metallurgical Company Ltd. as consulting engineer.

Fred Hemsworth, mines inspector and resident mining engineer for provincial department of the East Kootenay area, Canada, has resigned his position and will enter private practice at Cranbrook, British Columbia, as consulting engineer. **J. W. Peck,** who holds the same position in West Kootenay, will be acting inspector and engineer for the two districts until Mr. Hemsworth's successor is appointed.

H. F. Carpenter is now operating a small lead mine in Mexico. His office is located in Chihuahua City, Chihuahua.

Carl Kocn, a Danish mining engineer, is in the United States studying modern mining methods and mining production, pending his assignment at Greenland where he will be in charge of development of a huge new lead-zinc mine there.

John M. Brooks, Jr., is leaving his position as general manager of Minas de Matahambre S. A., at Matahambre, Pinar del Rio, Cuba.

J. McBeth is now in charge of operations at the Marmot Lead & Zinc Company's property on Marmot River in British Columbia. Canada.

Frank Canavan has been appointed chief geologist to the Broken Hill Proprietary Company Limited in New South Wales, Australia.

Elbert E. Lewis is now at La Paz, Bolivia where he is employed by the International Mining Company.

Stewart Carpenter, formerly on the Phelps Dodge Corporation staff at Douglas, Arizona, is employed by the Chile Exploration Company at Chuquicamata, Chile.

Harry Hey, managing director of the Electrolytic Zinc Company of Australasia Ltd., has returned to Melbourne, Australia, after an overseas business trip.

Recep A. Safoglu is acting smelter superintendent at the Murgul Copper mine operated by the Etibank, Ankara, Turkey. He is replacing **Sezai Cankut** temporarily, while Mr. Cankut is in the United States with a group of metallurgists. The visit is sponsored by the Organization for European Economic Cooperation, during which time 15 copper plants will be visited.

C. G. Tiglao, chief engineer of Atok-Big Wedge Mining Company in the Philippines, is acting general superintendent, replacing **R. H. Canon** who left. **Miguel Simon Jr.,** is acting mine superintendent, replacing **G. R. Pohl.**

E. D. Fox, for many years secretary of the McIntyre Porcupine Mines Ltd., Ontario, Canada, has been elected to the board of directors.

Dr. I. C. W. Hoevels, mine manager from Germany, recently visited iron mines at Ishpeming and Iron River, Michigan. He was accompanied by **R. O. Pynnonen** of the U. S. Bureau of Mines office at Duluth, Minnesota.

Aage Christensen, managing director of the Knaben Molybdenum Mines in southern Norway, is currently in the United States studying American mining methods.

J. T. Eddy has been appointed superintendent of Mountain View Gold Mine at Day Dawn, Western Australia.

L. J. Cunningham has left Morococha, Peru, for Cobalt, Ontario.

R. W. Stramler has been in El Salvador, Central America, for several months as general manager for Compania Minera de Oriente, S. A. His mail address is Chapeltique, Department de San Miguel.

A. C. Picard has been elected to the board of directors of Tungsten Corporation of Canada, Limited.

H. A. Steane has left his position with Uruwira Minerals Ltd. in Tanganyika, to join the staff of Mount Morgan Limited in Queensland, Australia.

D. W. Viles, vice president in charge of mining for Vanadium Corporation of America, recently returned to his headquarters in Durango, Colorado, after a business trip to mining districts in Chihuahua, Mexico.

T. F. True, formerly with Petaling Tin Ltd. in Petaling, Malay States, is now with Chenderiang Tin Limited, Chenderiang, Perak, Malaya.

R. L. McCann has been appointed manager of Black Cameron Gold Mine N. L., at Queenstown, Victoria, Australia.

F. C. Blickensderfer who was an engineer with the Union Corporation Limited of South Africa, at Johannesburg, is now with the South Western Engineering Company in Huntington Park, California.

J. W. Salter has retired as chief inspector of mines in New South Wales, Australia, after serving for 15 years in this position.

Miguel Shtamoff is now a mining engineer with Frontino Gold Mines, Colombia, South America. He was previously living in Buenos Aires, Argentina.

Saim Yurdakos is chief production engineer for Eregli Komurleri Isletmesi, Zonguldak, Turkey. He had been assistant superintendent for Dilaver Ocagi Munendisi in Zonguldak.

J. M. Rayner, chief geophysicist, Bureau of Mineral Resources, attended the International Geodesy and Geophysics meeting in Brussels as leader of the Australian delegation.

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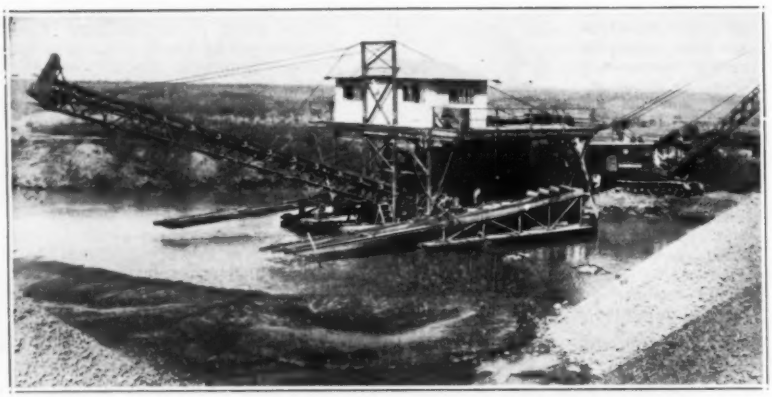

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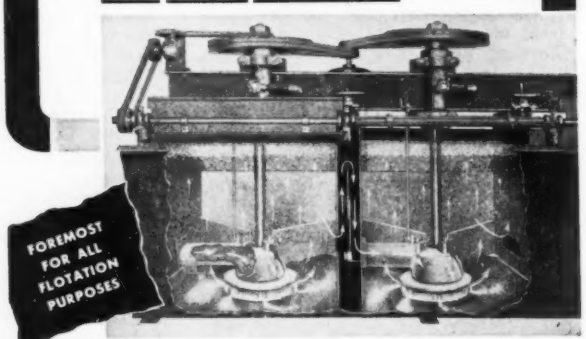

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INTERNATIONAL NEWS

Australia Expects To Overcome Copper Shortage

Australia's acute shortage of copper, brought about by a 20 percent cut in her allocation by the International Materials Conference at Washington, is expected to be overcome by the middle of next year as the result of increased local production.

Meanwhile, spokesmen for the various industries in Australia affected by the cut say it will be felt by all sections of the community and that many factories depending on non-ferrous metals may have to close.

However, a Government spokesman commented that Australia's own production of copper would nearly double after the middle of next year. The increased output would come mostly from the Mount Isa field in Queensland, where additional production was estimated at 17,000 tons a year. Present copper production is about 15,000 tons a year.

Cleveland-Cliffs—Ford To Mine and Mill Jasper

Biggest news to come out of Michigan's Upper Peninsula in recent months concerns formation of a company jointly owned by Ford Motor Company interests and Cleveland-Cliffs Iron Company to develop jasper. Jasper is the crude, low-grade iron bearing mineral which is found in great quantities on the Marquette Range. It will be taken from an open pit and passed through concentrating units to produce a product higher in iron content than ores now being mined in the Lake Superior region.

First of the concentrating units will be capable of producing 200,000 tons annually. Development of the property will begin immediately, and capacity production is expected late in 1953. A second unit of similar capacity is scheduled to be in operation by 1955. Another plant, planned for a later date, will agglomerate the concentrates into pellets suitable for use in both open hearth and blast furnaces.

Shipments of iron concentrates to Ford's River Rouge, Michigan steel plant will begin as soon as the first concentrating unit is completed. Ford will mix these concentrates with ore fines in its new sintering plant to produce enriched sinter which will be used for the production of iron and steel. Production from this plant will be part of the 2,000,000 tons of ore which Ford uses annually in its blast furnaces and open hearths.

The property to be developed and operated by the new company will be known as the Humboldt mine, located on the Marquette Range at Humboldt, Michigan. This property has not been operated since 1920. Records of some of the old operations go back to the early 1880's. Chief among them were the Washington mine from which 1,100,000 tons of ore was mined, and the Sampson mine which is on record as having shipped 267,000 tons of ore.

It is interesting to note that this particular property was the site of an earlier concentrating plant, for in 1896 Thomas B. Edison erected and operated an experimental mill for the magnetic separation of local jasper. Fire destroyed the plant before definite results had been obtained and it was not until 1947 that experimental work was resumed in this area by Cleveland-Cliffs.

A process for concentrating the lean ores at the Humboldt property was perfected at the C-C-I laboratory, erected in Ishpeming in 1949. In the same year, C-C-I and Ford jointly financed diamond drilling at the Humboldt property which established that a sufficient tonnage of crude material existed to warrant development.

Argonaut To Develop B.C. Iron Deposits

Iron ore deposits on Texada Island, as well as those on Vancouver Island, in British Columbia, will be developed by Argonaut Company, a subsidiary of Utah Construction Company, with a view toward increasing shipments to Japan.

A magnetic separator plant is to be installed on Texada Island, and Argonaut, which spent $3,000,000 on the Vancouver Island project in the Quinsam district, also will build a wharf near the new site to accommodate deep sea ships of 20,000 tons. Shipments are being made regularly from Campbell River, shipping point for Quinsam. Sixty percent magnetite concentrate is to be shipped to Japan every month, under the present schedule. Thirty-ton Euclid trucks are being used to haul the ore from Quinsam to the new port.

Iron ore was first discovered on Texada in the 1880's. During the early years Prescott Mining Company operated there, shipping to Irondale, Washington. Japanese blast furnaces welcome ore from British Columbia because they have been denied access to Communist-held mines on the Asiatic mainland which were their main source of supply before and during the war.

State Develops Phosphate Deposits in Transvaal

Phosphate deposits in the Transvaal, Union of South Africa, will be developed by the State as rapidly as possible. Roads are being built or improved, telephones provided, and plans made for housing a large staff while the Department of Mines prospects the deposits at depth.

These steps are being taken to assure a supply of the vitally needed mineral in the event of a war where imports of Moroccan phosphate rock might be cut off. Such a situation would cut in half the agricultural yields. Stockpiling of phosphate rock has proved impossible for various reasons, and imported phosphate is also expensive.

Within two years, the government hopes to begin production from the deposits which are located at Palabora.

Mineral Properties To Be Developed In Burma

An agreement has been reached between the government of the Union of Burma and the Burma Corporation, which owns lead-zinc-silver properties in Upper Burma. If the shareholders agree, which is likely, a new company, Burma Corporation (1951), will be formed to take over the whole of the undertaking in Burma. This corporation will be owned jointly by the present corporation and the Government, both of whom will subscribe the considerable quantities of new capital required.

Before the war, Burma Corporation was the largest producer of silver in the world—6,230,000 ounces in the year 1938-39. Among other valuable concentrates produced during that year were 77,000 tons of lead concentrates, and 61,000 tons of zinc concentrates. Prospects of production again on this scale are remote until law and order is restored in the districts through which the 500-mile railway to Rangoon passes. After that, a considerable sum will have to be spent on capital equipment both for mine and railway. Conditions in Burma at present do not encourage this.

Huge Aluminum Plant Will Be Built In Norway

Construction will start soon on a new aluminum plant at Sunndalsöra in West Norway. The plant will be the largest in Norway with an annual output of 40,000 tons. The project will be financed in part by a United States loan which will be repaid in the form of aluminum from the plant at the rate of 7,800 tons a year for 10 years.

The plant is being built by the same company that built the Ardal aluminum plant after the war, and constructiono and production experiences at Ardal are proving very useful in planning the new facilities. Many improved features are to be introduced which are expected to reduce costs appreciably. For example, provision will be made for transporting the raw material, oxide, in bulk instead of in sacks which is the current practice. The furnaces will have twice the power of those at Ardal, thus reducing both construction and labor costs. Two large buildings about 600 yards long and 150 yards wide will house 264 furnaces.

Six thousand tons of construction steel has been ordered from Germany, and a Norwegian factory will supply 12 mobile cranes with lifting capacities of 25 tons each. Converters and transformers will be manufactured in Germany and Norway. A 10-year contract has been negotiated with Aluminum Union Ltd. of Canada for the supply of (alumina) aluminum oxide.

Aage W. Owe, managing director of Ardal Aluminum Company, stated recently that the new plant involves an expenditure of £12,500,000. It is estimated that production costs will work out to just over £100 a ton.

German Non-Ferrous Ore Output To Increase

According to official estimates, German output of non-ferrous ore may show an increase of 18 percent for 1951 over production in 1950. Large efforts are being made to counter-balance shortages of supplies from foreign countries by developing the domestic mine output of lead, zinc, and copper. Production plans envisage an extension of activities in mines now working, reopening of idle mines, and development of new mining projects.

By these means, lead output from domestic mines is to be increased from 50,000 metric tons to 85,000 metric tons and zinc output from 70,000 to 90,000 metric tons by 1955. ECA credits are to be used for prospecting and development work in the Ruhr district, for the dewatering and reopening the Freyung lead mine, Bavarian Oberpfalz, and for development and modernization of Mechernicher Werke at Mechernich.

Copper output in Western Germany is secondary, chiefly being a by-product of lead-zinc mining in the Harz Mountains and on the Middle Rhine. Most of the pre-war production of 24,000 metric tons came from the Mansfeld mines in Eastern Germany. The Sontra copper mines at Hessen, the ore of which is estimated at 330,000 tons copper content, are to be exploited by two shafts. This year's output is estimated at 500 metric tons. In 1952, 170,000 tons of ore are to be raised containing 1,900 tons of recoverable copper. In 1953, production is to be increased to 220,000 tons, containing 2,700 tons of recoverable copper.

South Korean Tungsten Mines Back In Production

The Republic of Korea is currently producing 200 tons of tungsten concentrates a month. The entire output is being sent to the United States with the approval and support of President Syngman Rhee.

Some of the mines are located in ground which has see-sawed back and forth in control between the United Nations and Communist troops. In some instances, the tungsten is being mined while U.S. security troops protect workers from guerilla action.

Production of tungsten concentrates, 60 percent WO_3 basis, in South Korea was 1,448 metric tons in 1949 compared with 1,245 in 1948. Plans shortly before the outbreak of hostilities called for replacing existing recovery facilities with modern equipment at Sandong, which is reported to be one of the largest tungsten mines in the world.

From 1940 through 1947, about 850,000 tons of tungsten ore was mined from the Sandong deposits. From this amount concentrates containing 7,503 tons of WO_3 were recovered.

India's Jeypore Syndicate Mechanizes Mine

V. Ramakrishna of Madras, Chairman of the Jeypore Mining Syndicate Ltd., recently revealed that the syndicate's surface mine at Rayagada in the Koraput district of India is to be mechanized for increased output of manganese ore. The mine is presently producing 30,000 tons of 46 percent manganese ore annually, largely by hand labor.

By slushing over a ramp into trucks with a 20-hp, 3-drum hoist and scraper, the company expects to increase annual production to 100,000 tons. The loaded trucks haul the ore 22 miles to a transfer point for rail shipment.

Rich Iron Deposits Found In Mexico

An important iron ore deposit has been located in the vicinity of Villa Rica, in the state of Vera Cruz, Mexico, according to recent reports from Mexico City.

The deposit is estimated to contain a minimum of 1,000,000 tons of iron ore that will be exploited through the financing of the Nacional Financeria, the government finance corporation. Tests have indicated a 55 percent iron content.

The commercial exploitation of the deposit will be facilitated by the proximity of the area to the ocean outlets, making possible the shipping of ore by ocean carriers. Mining experts, however, are now studying the deposit to see whether or not to establish a large steel manufacturing plant in the vicinity to process the ore and export metal instead of mineral.

Mexican government and private geologists have been increasingly active in recent months trying to uncover new iron ore deposits in the country. So far, in addition to the Villa Rica deposit, several others of great importance have been discovered in the states of Oaxaca and Michoacan, as well as along the Pacific coast region.

Mexico is expected to produce a total of more than 300,000 tons of steel this year, while expansion projects have been approved both for the Altos Hornos de Mexico and the Monterrey Iron and Steel Works to increase still more the nation's production of steel. The latter company has added an investment of $6,000,000 for expansion purposes, while the Altos Hornos works, located at Monclova in the state of Coahuila, has received a $5,000,000 Export-Import Bank credit to expand its facilities.

Trucks To Replace Rail Cars in Canadian Mine

For the first time in Canada, trucks will replace underground mine cars to haul ore from a base metal mine. The new transportation system will be introduced by Canadian Exploration Ltd. at its lead-zinc mine at Salmo, southeastern British Columbia. Ten-ton trucks may be used at first, but ultimate use of 20-ton vehicles is being considered. Choice of equipment has not yet been made.

Use of the trucks instead of the conventional rail cars has been found feasible because of the size and nature of the ore deposits, which are large, thick, and flat, and extend more than a mile in length.

Canadian Exploration, which is a subsidiary of Placer Development Ltd. and affiliated with Bulolo Gold, Pato Consolidated, and other operations headed by Charles A. Banks of Vancouver, B.C., reports ore reserves of 7,500,000 tons, with the present concentrator handling 600 tons a day and due to expand to 800 tons.

Attapulgite Deposits Found In South Africa

Deposits of attapulgite, a clay mineral, have been discovered near Naboomspruit, Union of South Africa. They are said to be only the third known deposits of this mineral in the world.

Attapulgite is a hydrated silicate of aluminum and magnesium used for decolorizing and deodorizing animal, vegetable, and mineral oils. It could be used, among other things, in the dry cleaning industry, in the production of lanoline, and as a catalyst in the petroleum industry.

The deposits are reported to be near the railway line between Naboomspruit and Zebediela. Transportation, therefore, should be no problem.

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Small Gold "Strike" In The Philippines

A 1951 version of the California gold rush is reported to be taking place in the Baguio mining district of the Philippine Islands, with the recent discovery of a gold deposit in a rice field near the abandoned prewar property at Antamok Goldfields Mining Company.

Scores of natives from Antamok, Sangilo, and Acupan have rushed to the "find" on the southwesterly extension of the Keystone vein system with the Baguio gold mining district. A small tunnel is reported to have been dug to exploit the vein and the miners are working in shifts around the clock. Taken home in bags, the ore is pulverized and refined by crude, flat rub rocks, as the natives used to do centuries ago. Then the precious metal in the yellow dust is panned.

Local oldtimers recall that the Benguet Consolidated and Big Wedge mines also had their beginnings with the main Keystone vein. At the outbreak of World War II the ore body in the Antamok mine was so nearly exhausted that the mine was not put back into operation after the war. However, with the new "strike," the old company or a new one might possibly come in to handle operations.

Asbestos Output Expands In Southern Rhodesia

Asbestos is rapidly overtaking gold as one of Southern Rhodesia's most profitable mineral products. Value of output this year is likely to reach £5,000,000 only £1,000,000 short of gold and five times the value ten years ago.

Output is rapidly expanding under the spur of increasing demand especially from the building trade. A new company, Rhodesia Monteleo Asbestos, which was formed last July, has holdings comprising 12 blocks of claims covering 740 acres in the Vukwe hills, 15 miles southeast of Shabini. Test investigations show 1½ percent to 2½ percent asbestos with an average market value of £175 a ton.

Production should begin in under 12 months and plant capacity has been provided for an initial milling rate of 15,000 tons of asbestos ore. Two "aerofall" milling units with all auxiliaries are due

INDIA—Sales of kyanite by the *Indian Copper Corporation* reached a record total of 23,717 tons during the last fiscal year. The price also rose rapidly during that period so that the company's profit on sales was increased by £59,445 to £90,516. The demand for Indian kyanite is increasing but the government has curtailed its export so profits for the current year are expected to decrease. The possibility of recovering sulphur from sulphur-bearing roaster and smelter gases at the corporation's smelter at Moubhandar is being reconsidered and an expert is now visiting the property to report and advise on the project. Prior to 1939, the project had been considered but was abandoned as uneconomic.

JAPAN—Some 8,000 tons of nickel ore were shipped from New Caledonia in August, destined for treatment at the Saganoseki Oita Prefecture refinery of the *Nippon Mining Company*. About 600 tons also came from the United States. In its search for iron ore, Japan has contracted for 38,000 tons from Egypt, while 150,000 tons will be shipped from Goa, India, during a period of three years starting next September. The latter was the result of negotiations between the *Chowgi Company* of Goa and the *Japan Steel Pipe Company*. Japanese capital, from the Japan Export Bank, would be required to develop the mines. During the first half of 1951, Portuguese India exported 61,123 tons of iron ore, as compared with 35,494 tons a year ago.

MALAYA—Many rubber estates are being examined as prospective tin sources by Chinese tin miners because good and workable mining land is being depleted. In Kuala Lumpur, miners are reported to have paid up to 2,500 Straits dollars per acre for estates which are expected to contain rich tin-bearing gravel.

INDIA—The Deputy Chief Controller of Exports announces that the Government has fixed a limited quota on alumina export during the current year. About 10 tons is expected to be shipped to Japan shortly.

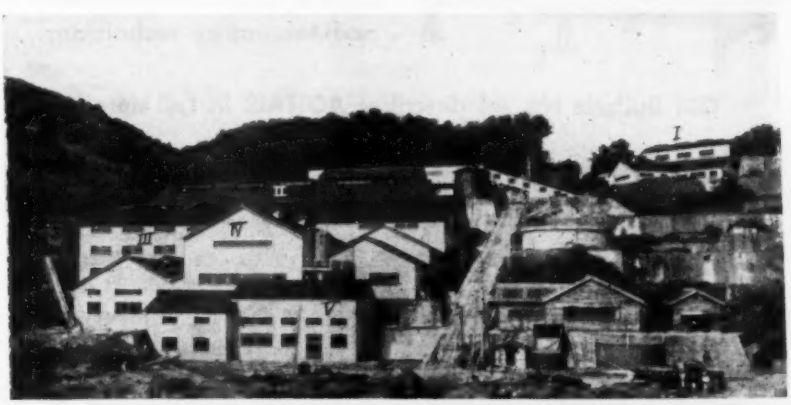
MALAYA—The *War Damage Claims Commission* has awarded *Taiping Consolidated Ltd.* 616,467 Straits dollars against the cost of restoration, plus a provisional award of 114,106 Straits dollars to cover items lost but which the company does not intend to replace. For tin lost in transit during the fall of Malaya to the Japanese in World War II, the Commission awarded 8,500 Straits dollars to Taiping and 20,000 Straits dollars to *Rantau Tin Dredging Company Ltd.*

INDIA—A radio-active mineral belt is reported to have been discovered by a private company in the State of Bihar. The belt was first found at Bhema in the district of Manbhum, and is said to contain thorium, uranium, cerium, and other minerals. First physical examination of samples showed a uranium content of 0.406 percent, which would entitle the company to the government's reward of 10,000 rupees. A later chemical examination, however, placed the uranium oxide content at only 0.12 percent which was less than the stipulated 0.4 percent. The Indian Atomic Energy Commission advised the discoverers then that it was not interested in the find, but the firm claims that untapped deeper seams are of considerably higher grade. The firm has asked the government to permit it to export the minerals.

BURMA—Communist-inspired uprisings in the tin mining district of lower Burma have brought mining to a standstill. European staffs have been confined to nearby towns and not allowed to go to the mines for security reasons. Troops have been sent to some of the unsettled areas but not much has been accomplished in restoring law and order.

BRAZIL—Important mineral deposits containing tantalum, rare earths, uranium, and thorium have been located in the district of Machado, State of Minas Gerais. The minerals occur in pegmatite dikes, the feldspar minerals being completed weathered to kaolin.

GUATEMALA—A new smelter is said to be ready to start shipping lead to the United States, at the rate of 500 tons a month. The smelter is owned by *Com-*



JAPANESE CYANIDE PLANT OPERATING

The reconstructed all-slime cyanide plant of Kushikino gold-silver mine is treating about 300 tons per day and an ultimate capacity of 400 tons per day is expected by September 1952. Owned by the Kamioka Mining Company (formerly part of Mitsui Mines Company), the mine and plant are located in Kushikino, Kagoshima Prefecture, Kyushyu. The photograph above shows (1) the crushing mill, (2) mill building, (3) agitation plant, (4) filtering plant, and (5) Merrill-Crowe precipitation plant.

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pania Miners de Huehuetenango, S.A. During the first nine months of last year, United States lead imports from Guatemala amounted to 1,861 tons in the form of ore, matte, etc., according to the American Bureau of Metal Statistics.

MEXICO—The filing of 46 claims during October, the most it recorded in a month in many years, was reported by Jose Vigil Calero, agent of the mines department of the *Ministry of National Economy* in Oaxaca City. That agency covers Oaxaca and Chiapas. Of the claims, 30 were in Oaxaca and 16 in Chiapas. Most were for silver, copper, zinc, and antimony, but nine of the Oaxaca claims were for iron deposits on the Isthmus of Tehuantepec and in the Mixteca District.

BRAZIL—The *Compania Brasileira de Aluminio* will build Brazil's second aluminium plant. The project will be built at Sao Paulo and will produce 7,000 tons annually. Necessary machinery will be brought in from Italy and Western Germany. Brazil's first plant began operating in October and is being run by *Eletroquimica Brasileira*, an indirect subsidiary of *Aluminium, Ltd. of Canada*. It can produce 2,000 tons of metal. If their schedules are maintained, the two plants will turn out 9,000 tons a year; Brazil imports on the average of 10,000 tons annually so foreign purchases are expected to decline.

BOLIVIA—The *United States Export-Import Bank* has advanced $1,000,000 to Bolivia to expand tungsten production. In return for the loan, the *Bolsa Negra* mine east of La Paz will sell all of the tungsten it produces between January 1952 and December 1956 to the *United States Emergency Procurement Service*.

BRAZIL—A 60-ton contact sulfuric acid plant has been ordered by SA *Reunidas F. Materazzo*, a large South American producer of synthetic yarn. The plant, ordered from the *Chemical Construction Corporation* of New York, will use a form of pyrite known as "coal brasses" for the raw material. This is a local sulphur-burning ore which contains 40 percent sulphur and 4 to 10 percent carbon. It was specifically designed in answer to the existing world-wide sulphur shortage. The new plant is the third built for the same firm in Sao Paulo.

MEXICO—Though steel production totaled 531,631 tons in 1950, it was necessary to import 250,000 tons, mostly from the United States, Great Britain, and Belgium. The *Ministry of National Economy* listed production of iron and steel as follows: *Cia Fundidora de Fierro y Acero de Monterrey*, 187,500 tons; *Altos Hornos de Mexico*, 177,231 tons; *La Consolidada*, 89,500 tons; *Hojalata y Lamina*, 32,400 tons; *Aceros Tlalnepantla*, 18,000 tons; *Fundicion de Lamina Chapultepec*, 6,300 tons; *The Teziutlan Copper*, 6,300 tons; *Fundidora de Hierro y Acero*, 5,400 tons; and *Fundidora de El Rosario*, 2,700 tons. Production during 1951 increased but importing was still necessary. Europe began to supply much of the steel, because the United States, Mexico's greatest supplier, had to meet war demands.

BRAZIL—Brazilian lead production will be considerably increased when deposits of galena found in Furnas, Lageado, Braco de Pescaria, and Monjolinho, all in the state of Sao Paulo, are put into production. Current lead production from Brazil is 20 metric tons per day.

COLOMBIA—The $15,000,000 alkali plant, opening near Bogota, will have an annual production capacity of 36,500

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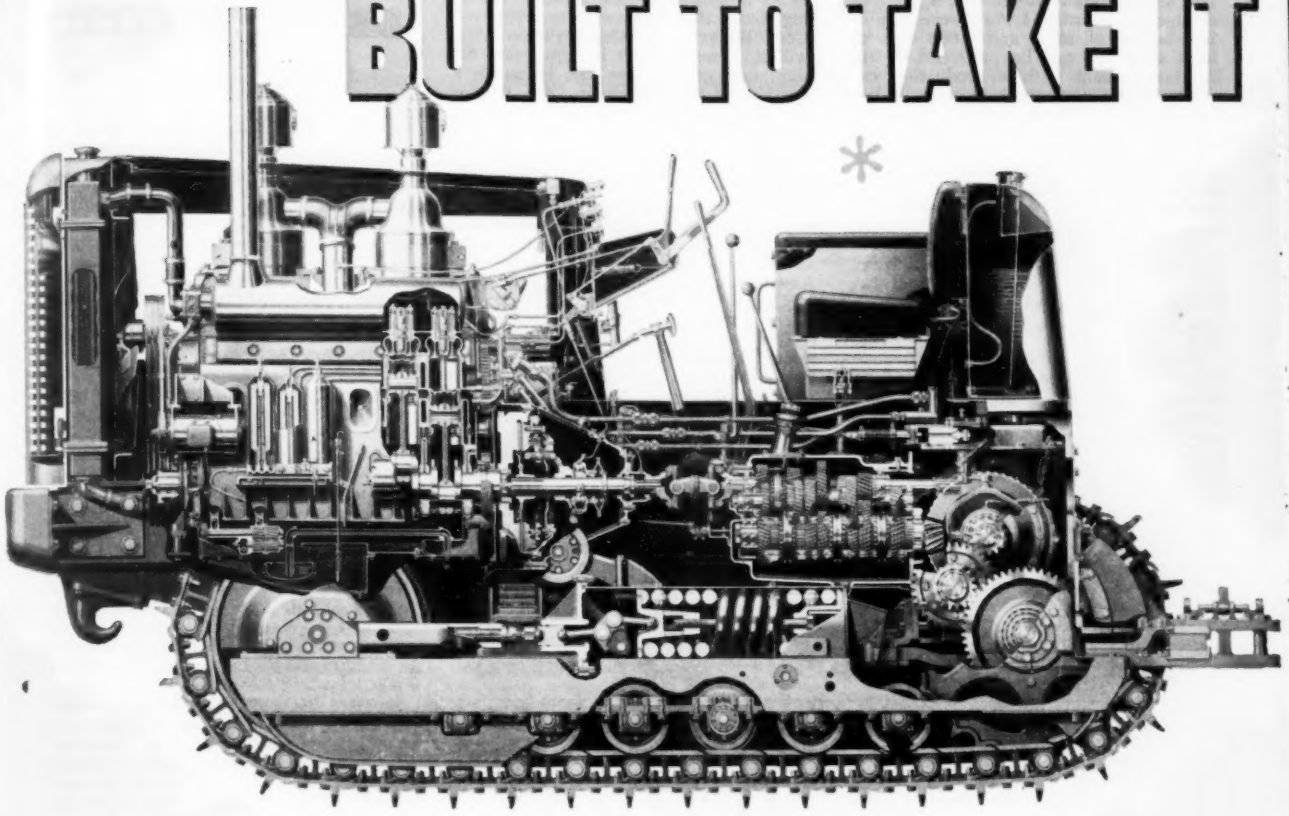

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metric tons of soda ash. From this, 18,250 metric tons of dense ash, 9,125 tons of chemical caustic, 4,380 metric tons of bicarbonate of soda, and 3,600 tons of light soda ash can be produced. A refined salt plant with a production capacity of 73,000 metric tons annually has been designed but not constructed. The new plant was built for the *Instituto de Fomento Industrial*, a Colombian governmental agency in charge of industrialization, and the *National Bank of Colombia*. The plant is near extensive salt mines at Zipiquira, 30 miles from Bogota.

MEXICO—The *National Commission for Stimulation of Mining* has been placed in charge of iron deposits at La Union, Guerrero, and Arteaga, Michoacan, by the *Ministry of National Economy*.

BRAZIL—*The Brazilian Geological Survey (Departmento Nacional de Producao Mineral)* has been informed that important deposits of monazite have been found near the Santo Antonio River, Rio das Mortes, in the state of Minas Gerais. Monazite occurs in this deposit associated with cassiterite.

VENEZUELA—*Orinoco Mining Company*, a *U. S. Steel Company* subsidiary, has signed an agreement with the Venezuelan government for the dredging and maintenance of a ship channel through the Macareo and Orinoco rivers. This will permit ocean-going ore carriers to proceed directly from the ocean to the loading docks to be installed by Orinoco Mining Company at the river terminal of its proposed 90-mile railroad, extending from the company's ore mines at Cerro Bolivar to the Orinoco River. Work will start soon and it is hoped that first shipments of iron ore can be made to the United States early in 1954. Cost of dredging is estimated at $30,000,000 with $1,500,000 a year needed to keep the river navigable.

MEXICO—*Petroleos Mexicanos (Pemex)*, the official oil company, has been authorized by the Ministry of National Economy to ship 2,000 tons of sulphur from its plant in the Poza Rica oil fields, Vera Cruz, to the *Anglo-Newfoundland Development Company, Ltd.*, in Canada, which is one of the chief suppliers of newsprint to Mexico. The ministry has also authorized the *Huascaman* mines, Cerritos municipality, San Luis Potosi, to send the Canadian company 500 tons of sulphur. The ministry is considering applications from Great Britain, Sweden, Finland, and Brazil for supplies of Mexican sulphur. At present, Mexico's sole sulphur producers are Pemex and Huascaman, but sulphur production in various parts of the Isthmus of Tehuantepec, Oaxaca, and Vera Cruz is expected soon. The Hidalgo government and the Mexican government are to build a short road to link with the Mexico, D.F.-Tuxpan, Vera Cruz highway. This will facilitate trucking of sulphate of barium from Las Minas, Hidalgo, to the Pemex refining at Poza Rica, Vera Cruz.

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TASMANIA—The annual report of *Aberfoyle Tin N.L.*, at Rossarden, showed 33,288 long tons mined for a production of 451.5 long tons of tin concentrate and 291.7 long tons of wolframite concentrate. Diamond drilling indicates that the granite contact is dipping at 49° and has proved the existence of the main vein system, still in the sedimentary rocks, 400 feet below the mine's deepest working level. Drill cores from a 12-inch vein at this depth were rich in wolframite. H. J. Connolly, consulting geologist, has made proposals for further prospect diamond drilling in nearby areas for similar vein systems. Potential ore reserves above this intersection are 500,000 long tons.

QUEENSLAND—*Mt. Isa Mines, Ltd.*, has absorbed *Mining Trust Ltd.*, thus acquiring the *Britannia* lead refinery at Northfleet, England. The company has also announced plans to purchase a large interest in *Bowen Consolidated Coal Mines Ltd.*, which is to be mechanized and expanded. With the possible installation of a coking plant, Mt. Isa's fuel position should be assured. The production of copper at Mt. Isa is expected within six to nine months.

NEW ZEALAND—The *Blackwater Mines Ltd.*, operation at Waiuta near Reefton, is to be abandoned. This was a relatively small gold mine operating at a depth of 2,500 feet in bad ground. In July 1951, a portion of the shaft collapsed 360 feet below the collar, stopping ventilation and destroying the pumping column. Bottom levels were flooded, and, since operations had not been profitable, it has been decided to close down.

PHILIPPINE ISLANDS—The *Itogon Mining Company*, one of the largest gold mining companies on Luzon before the war, has resumed operations after nearly two years of rehabilitation. The mine, which before the war had an annual production of $1,250,000, was completely destroyed. Reconstruction was financed partly by a loan from the Rehabilitation Finance Company.

AUSTRALIA—Two Australian mining companies have reported a record production year during 1951. *North Broken Hill Ltd.* has reported a profit of $5,615,000, while *King Island Scheelite Ltd.* has announced a dividend of 160 percent to shareholders. The profit of Broken Hill is the largest ever recorded by the company, and is attributed by its chairman, M. H. Baillieu, to increased prices for metals, a greater tonnage of ore mined, and improved income from investments. During the year, more than $2,250,000 was appropriated for new plant and mine development. The dividend announced by King Island is 56¢ a share, bringing the total of the year to 89¢. Paid capital of the company is $1,150,000. King Island is the biggest producer of tungsten in Australia, and is under contract to sell its output to Britain and the United States. Production for 1951 to November was worth $3,902,500.

NEW GUINEA—The Golden Ridges mill, operated by *New Guinea Goldfields Ltd.* at Wau, has been placed in operation. Construction of a cyanide treatment plant is not yet completed.

VICTORIA—*Consolidated Tin Dredging Company Ltd.* has been registered in Melbourne with a nominal capital of £A5,000,000. The new company will acquire the assets of the following Melbourne-owned tin companies operating in Malaya and Siam (Thailand): *Tongkah Compound No. 3 N.L., Tongkah Compound No. 4 N.L., Tongkah Compound No. 5 N.L., Kuala Lumpur Tin N.L., Satupulo N.L., Tinsongkhla N.L.*, and *Ronpibon Tin N.L.*

EUROPE

PORTUGAL—An amendment to the Franco-Portuguese trade agreement is reported to have been approved by the Portuguese government. It provides for the export of 40 tons of wolframite to France.

SWEDEN—According to E. Waldenstrom, managing director of the *Luossavaara-Kiirunavaara Mining Company* in northern Sweden, the company will increase its production from 9,000,000 tons of iron ore per year to 15,000,000 tons, if the government will accept the company's plan. Investment costs alone are estimated at 60,000,000 crowns. In 1952, this company also expects to increase its ore transports on the Kiruna-Narvik railroad from 8,000,000 to 10,000,000 tons. This will necessitate an increase in the number of cars per train, as well as the number of trains per day. The load per axle must also be increased from 18 to 20 tons.

LUXEMBURG—After a long interruption, iron ore from Luxembourg is again being delivered to Western Germany. An agreement provides for exporting 245,000 tons of ore assaying an average 25 percent Fe, at a price of 145 Belgian francs per ton, free Wasserbillig, on the German-Luxemburg frontier.

FRANCE—Aluminum consumption is said to have outstripped the production rate because of restrictions on copper. Aluminum output rose from 45,000 tons in 1930, to 53,000 tons in 1948, 63,000 tons in 1950 and an estimated 80,000 tons in 1951. The increase this year has been the result of a modernization program and an improved supply of electric power.

FINLAND—A detailed investigation of the ore deposits in Finland by an industrialization committee has brought the conclusion that Finnish mines will be exhausted within ten years. Exception to this is the *Outokumpu* copper mine where mining may be continued for another 30 years. The committee also revealed that the country may soon be handicapped by a shortage of electric power.

EASTERN GERMANY—According to reports from a meeting of the Eastern German Parliament, copper production in the Eastern German Republic is to be increased by 200 percent within five years, production of lead concentrates by 533 percent, and zinc concentrates by 662 percent. Aluminum output is to be increased to a level which will meet all requirements of the Republic. The erection of the necessary reduction plants has been started.

GREECE—The *Larymna* nickel mines may be operated by a London firm, *Messrs Roura and Forgas*, if proposals are accepted by the Greek government. The company primarily requests that the concession be granted on a long-term basis. In return, the company would process the ore locally, would meet all expenses connected with the operations, and would train Greek personnel in the processing and extracting of the ore.

YUGOSLAVIA—The government is reported to have allowed over 240,000,000 dinar in its 1951 budget for the expansion of mining and smelting facilities at the *Zajaca* property.

SWEDEN—Since 1939, gold production has shown a considerable decrease as is apparent from the figures below:

Year	Gold Production (kilograms)
1939	6,093
1946	2,849
1947	1,765
1948	2,009
1949	2,185
1950	1,520
1951	1,500 (approx.)

This decline may be traced primarily to the fact that the mine at *Boliden* which is the main source of gold in Sweden has, for technical reasons, cut down its production.

NORWAY—The iron ore mines of *Sydvaranger, Inc.* which were badly damaged during the war are now almost rebuilt. Production should start early in 1952 and it is hoped that 500,000 tons may be exported during the year. In 1953, production may be raised to 1,000,000 tons, all of which will be exported, earning £3,250,000 for Norway. The Sydvaranger mines are the largest in Norway and lie near Kirkenes in the north.

PORTUGAL—*Beralt Tin and Wolfram Ltd.* has concluded arrangements with the British Ministry of Materials for the sale of a substantial proportion of the company's output for the next two years. Half of the output will be sold at a fixed price and the other half will be at the prevailing market price. It is reported that the effect of this contract, taken in conjunction with that made with the United States in May, is that about 50 percent of the company's estimated production has been contracted for at fixed price until the middle of 1953.

HUNGARY—Initial production at the *Danube Valley Iron Works*, 40 miles south of Budapest, has started. Official sources state that 810,000 tons of coal will be used to process iron ore imported from the U.S.S.R. When completed, the works will produce more iron and steel than all other existing works in Hungary. Under the current Five-Year Plan, 51 coke ovens, two large blast furnaces (probably over 1,000 tons daily capacity each), four 125-ton open hearth furnaces, and hot and cold rolling mills will be installed. Under the second Five Year Plan (after 1954) two more blast furnaces a ferro-manganese furnace and four additional open hearths are to be installed.

DENMARK—Iron ore is being exported to the Ruhr, Germany, from an iron deposit found at Sonderjylland. The ore lies three feet deep and is easily accessible. The production, which is now 60 tons a day, is expected to increase in the near future to 200 tons a day.

SPAIN—A 1,000-ton capacity blast furnace reportedly has been ordered from an Anglo-American firm for the new semi-State iron and steel plant planned for erection at Aviles. A German firm is to build coke batteries which will be paid for partly by iron ore from the *Vivero* mines. The works will produce semi-finished steel at first. Later, a complete rolling mill plant is planned.

SWEDEN—Six Swedish iron works have requested permission from the State

SHUTTLECARS FOR FRENCH MINES

A "JOY" shuttlecar overcomes some slippery going in the Algrange Iron Mine in French Lorraine. The Societe Alsacienne de Chargement Mechanique, licensed by Joy Manufacturing Company, has started shuttlecar production in France and is considering the manufacture of loaders. The car in the picture was made in the United States.

Employment Board to hire 215 foreign miners for their operations. In anticipation of increased steel production during 1952, 45 percent more scrap iron will be needed. A program has been set up to obtain this material.

AUSTRIA—Output of aluminum for the first eight months of 1951 reached 21,124 metric tons, compared with 13,399 tons in the same period of 1950. A new post-war monthly peak was reached in August with a total output of 4,192 metric tons.

NORWAY—Effective August 1, 1951, export taxes were imposed on sulphur, pyrites, and copper-bearing ores. The tax on sulphur is 150 crowns ($21) a metric ton, pyrites at 5 crowns ($0.70) a metric ton, copper-bearing ores at 300 crowns ($43) a metric ton of copper content. The revenue from these taxes will be used for price-stabilization purposes. During 1950, Norway exported 76,162 tons of sulphur, 389,000 tons of pyrite, and 11,000 tons of copper ore.

SWEDEN—Ore exports during the first nine months of 1951 increased by 1,700,000 tons or from 9,561,000 tons in 1950 to 11,268,000 tons in 1951. Exports of iron and steel increased from 130,000 tons to 190,700 tons. Domestic ore prices rose 31 percent during this period.

NORTH AMERICA

NORTHWEST TERRITORIES—A 100-ton mill is being purchased by *Salmita Consolidated Mines Limited* for the company's gold mining property on Matthews Lake, 150 miles north of Yellowknife. A mill test was conducted by the Department of Mines from 200 pounds of ore shipped for Salmita's drift on the first level. Two-ounce millheads were used for the test. Since ore is free-milling, it is estimated that 80 percent is recovered by amalgamation, and an additional 15 percent by cyanidation. Average sample (uncut) values of one ounce gold per ton were reported across the full drift width in Salmita's underground operations last year.

BRITISH COLUMBIA—Edward G. Brown and associates of Vancouver have entered into a $200,000 purchase contract with Mrs. Norene E. Shallenberger of Spokane, Washington for the *International Lead and Iron* group of 18 mining claims across the Canadian boundary from the Metaline mining district in northeastern Washington. The International adjoins on the south the *Reeves MacDonald* mine property controlled by *Pend Oreille Mines and Metals Company*. Exploration work has started under the direction of Arthur Lakes, mining engineer of Nelson, B.C. and Spokane.

QUEBEC—Diamond drilling on the Chibougamau copper property in which *Continental Copper Mines* has an interest has been halted by a freeze. Results are inconclusive to date.

NEVADA—*Anaconda Copper Mining Company* will construct plant facilities at its low-grade oxide copper property near Yerington. About 35,000,000 tons of ore will be mined by open-pit methods. A low-grade sulphur deposit in Alpine county, California will also be developed to provide sulphur ore for sulphuric acid production with which to leach the oxide ore.

ONTARIO—Iron ore shipments through Port Arthur set an all-time record in 1951 for the second consecutive time. At the season's close, tonnage for the year was 1,325,000 tons, all from Steep Rock. Officials of *Steep Rock Iron Mines, Limited* report that 1,216,614 tons were moved during 1950.

YUKON TERRITORY — *Mackeno Mines* may have tapped a previously unknown silver vein at its property in the Keno Hill district. A drill test hole intersected 26 ounces of silver across 5.5 feet on the second or 200-foot level. It may indicate a parallel vein since the intersection is 33 feet along the fault from the point where the main vein was cut off but appears to be in a different direction. The main vein has been drifted for an ore length of 253.5 feet on the second level.

BRITISH COLUMBIA—*Western Uranium Cobalt Mines* reports that its *Red Rose* mill near Hazelton is operating, following installation of a 1,600-hp, hydroelectric plant. The mill is designed to handle 200 tons per day and it will be enlarged shortly. About 30,000 units of tungsten were produced during November and December.

WORLD MINING
Issued as an International Department of MINING WORLD
by American Trade Journals
Publishing Office
Emmett St.
Bristol, Conn.

Editorial & Executive Office
121 Second St., San Francisco 5, Calif.
A Miller Freeman Publication

Publisher . . . . . W. B. FREEMAN
General Manager . M. F. HOLSINGER
Editor . . G. O. ARGALL, JR., E. M.
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WORLD MINING is published the 26th of each month as a regular department of MINING WORLD and is also circulated as a separate section on a carefully controlled free basis to a selected list of management and supervisory personnel associated with active mining enterprises throughout the world.

ONTARIO—*New Ryan Lake Mines* has started on an expanded development program, after a reorganization of the company. Present capacity of the mill is 72 tons daily and it is hoped that the new program will open up sufficient ore to justify an increase in milling facilities. It is also planned to recover the molybdenite content of the ore. The company has been making fairly steady shipments of copper concentrates from its *Matachewan* property to the Noranda smelter.

QUEBEC—*United Asbestos Corporation Limited* has explored its properties by diamond drilling to the extent of more than 38,000 feet, of which 32,049 feet in 54 holes were drilled at Black Lake. Mineralization to an average vertical depth of 540 feet have been indi-

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cated within the confines of the drilled area in two bodies without delimiting either their lateral or vertical extent. Two other mineralized areas have been disclosed by diamond drilling and geophysical work but neither of these has been sufficiently explored to permit an estimate being made of their tonnage. A complete up-to-date mining plant has been installed on the east shore of the lake. A three-compartment vertical shaft 570 feet deep was completed in March 1951, and underground lateral development since that date totals 3,854 feet on the 260-foot level and on the 540-foot level. About 34 tons of ore was shipped for ore processing to test the grade, value, and milling characteristics of the ore and the quality of the fibre. *Denovan Limited*, specialists in asbestos milling, have been engaged to design a milling unit suitable for the company's requirements.

BRITISH COLUMBIA—San Francisco interests, headed by Hugh Coke, have applied to the *United States Defense Minerals Procurement Agency* for a $400,000 advance against production to finance a large, open-pit mining operation and construction of a 500-ton mill at the *Motherlode Sunset Copper* mine near Greenwood. The British Columbia property, last operated in 1918, was examined recently by Region II (Northwest) field team of the *Defense Minerals Administration* at the request of DMPA's foreign division. Members of the field team included A. E. Weissenborn, head of the *United States Geological Survey's* regional office at Spokane.

LOUISIANA—*Kaiser Aluminum & Chemical Corporation* plans to double its aluminum reduction plant and power facilities now under construction in the New Orleans area. Plant capacity will be increased to 200,000 tons per year, and total cost of expansion will be $100,000,000. Facilities will also be added to increase bauxite production at Kaiser's mines in the British West Indies.

ONTARIO—*Castle-Trethewey Mines Ltd.* has shut down its 10-ton concentrator for the winter. This will save heating and other costs, and will also give exploration and mine development work a chance to get ahead of the mill. Underground work fell behind because of a labor shortage in the Gowganda area.

BRITISH COLUMBIA—*Estella Mines, Ltd.*, located near Wasa in the Cranbrook district, has gone into production with a mill capable of handling 250 tons of lead-zinc ore daily. This is one of the province's newest base metal developments. About $1,400,000 was spent on purchase and development of the property up to the production stage. A. F. Kent is manager.

NOVA SCOTIA—*Anacon Extension Ltd.* has contracted for 3,000 feet of diamond drilling on a copper prospect at Adams Island in Charlotte county. *Inspiration Mining and Development Company* is doing the work. A geophysical survey will also be made of the company's 2,500-acre property adjoining *Anacon Lead Mines* in Portneuf county, Quebec.

NORTHWEST TERRITORIES—*Tungsten Corporation of Canada Limited* estimates that the gold content of its tungsten-gold property will more than offset the overall cost of operations. All returns to date from the current diamond drill exploration of the No. 2 ore zone exceed 0.10 ounces of gold per ton. On the basis of the computation of probable ore for this zone, the newly discovered extension is estimated to increase probable ore tonnage from this section more than 60 percent, or from approximately 16,000 tons to about 26,000 tons estimated to a depth of 200 feet. Simultaneous with the diamond drill testing of the No. 2 ore zone and milling operations, dewatering of No. 1 shaft workings is going on. Upon completion, this will be followed by a systematic geologization of the complete mine workings. Though hampered by one of the earliest freezes in the history of the North, little time has been lost in an around-the-clock schedule.

ONTARIO—*Consolidated Duquesne Mining Company Limited* has authorized an amalgamation with *Consolidated Beattie Mines Limited*. The amalgamation will make it possible for Duquesne ore to be treated at the Beattie mill along with the Beattie ore instead of as two separate operations. This will assure Beattie of continued operation and will save Duquesne from the large capital investment of a mill. Duquesne holds about 84 claims east of Beattie property, only a small number having been developed. Recently, the shaft was deepened to 1,250 feet and new levels at 875 and 1,000 feet are being opened up. Beattie is still a large and important mine. Its mill is capable of handling about 1,800 tons of ore daily, and it has the neces-

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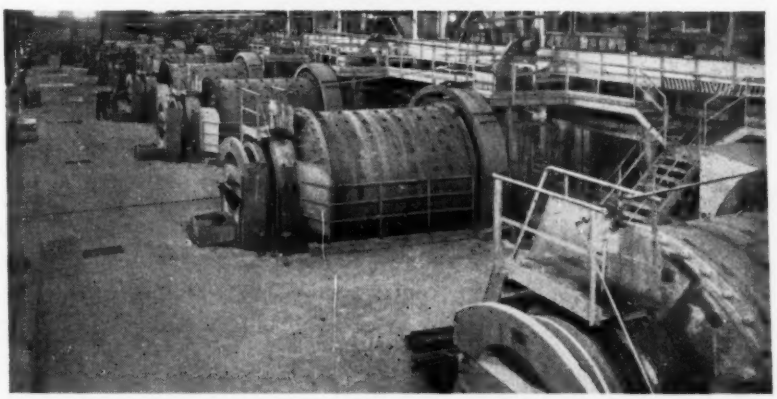

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sary mining plant and equipment for a large-scale operation. However, the mine grade of the ore is comparatively low.

BRITISH COLUMBIA—*Coronado Copper and Zinc Company* of Los Angeles, a subsidiary of *Cyprus Mining Corporation*, controlled by the Harvey S. Mudd interests, is considering entry into the British Columbia mining picture, according to Stanley A. Spellmeyer, engineering executive of the company. Spellmeyer conferred with Dr. John F. Walker, deputy minister of mines, in Victoria, and told him that his company was interested in all types of ore except gold.

MICHIGAN—The White Pine copper deposits in the Upper Michigan Peninsula area will be brought into production under a $57,185,000 loan approved by the *United States Reconstruction Finance Corporation*. *White Pine Copper Company*, a subsidiary of the *Copper Range Mining Company*, expects that within 36 months a goal of 70,000,000 pounds of copper output annually will be reached.

ONTARIO—Mineral rights to the old *Stobie* copper mine in the Sault Ste. Marie district have been acquired by *Chipman Lake Mines*. The property consists of nine claims and was last operated about 1901 when a shaft was sunk to about 160 feet. About 280 feet of drifting on a copper-bearing vein was completed on the 100-foot level. It is now proposed that the length of the known vein be investigated by diamond drilling, that the shaft be dewatered, and the old workings carefully sampled.

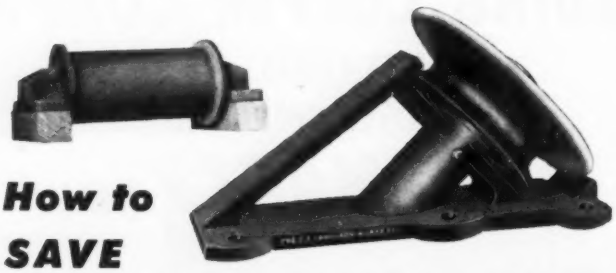
BRITISH COLUMBIA—This winter, milling will probably be initiated at *Kootenay Base Metals* property 18 miles east of *Consolidated Mining & Smelting Company's Sullivan* mine near Cranbrook. *Transcontinental Resources Ltd.* reports that a road from the railroad at Fort Steele has been completed. Capacity of the plant will be 60 tons daily.

SASKATCHEWAN—*Radiore Uranium Mines* continues to drill and to rock trench three of the principal showings on the *Ace* group. A mining plant is being flown down from Yellowknife to permit the driving of an adit on what is known as the C-1 zone at an elevation that will give backs of about 80 feet. The adit will be followed by the sinking of a shaft. The portable plant will then be moved to other zones.

UNITED STATES—The *Department of the Interior* has announced the signing of 29 new contacts for government-assisted exploration projects in 12 states and the Territory of Alaska. The new contracts involve 12 commodities, including, beryl, mica, steatite, talc, lead, zinc, uranium, antimony, copper, tungsten, manganese and mercury with lead and zinc projects leading in size and number. The over-all cost will be $1,518,196, of which the government's share will be $888,848, or about 58.54 percent. The projects are in South Dakota, North Carolina, Utah, Idaho, Nevada, Arizona, California, Colorado, Montana, New Mexico, Wisconsin, Washington, and in the Territory of Alaska. The largest is in search of lead and zinc, and will be undertaken by the *Silver King Coalition Mines Company*. Summit county, Utah, at an over-all cost of $321,534. The smallest project involves only $325 on a talc project in North Carolina.

QUEBEC—A new Exploration Department and a new Sales and Merchandise Department have been formed as part of *Johns-Manville Corporation's* expansion program in Canada. According to the company, although J-M production has increased more than ten-fold in the past 35 years and the progress made at the *Jeffrey* and *Munro* mines has added to the company's supply, they must continue to seek new sources of asbestos fibre to meet the intensified demand. The function of exploration for new sources is of such major importance that the company deemed it necessary to make special provision for it. Headquarters of *Asbestos Fibre Division* will be located at Asbestos, Quebec, while the Exploration Department and the Sales and Merchandise Department will be at Montreal.

BRITISH COLUMBIA—*Chillicopper Corporation Ltd.* of Toronto has taken over control of *Rico Copper Company* through the purchase of shares of stock. Chillicopper plans to go ahead with construction of a 4,000-foot tunnel at a cost of about $500,000. Preparatory work for this project is under way. The tunnel will be at an elevation of about 4,500 feet, going in under the main ore body. Construction is expected to take about a



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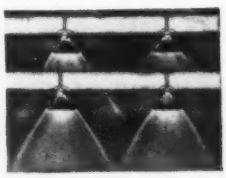

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year. The property is in the Cheam Range, 15 miles south of Laidlaw.

ONTARIO—*Dunvegan Mines* has undertaken a complete geophysical survey of its nickel property in Kenogaming Township, 10 miles east of Horwood Lake. Diamond drilling will follow after the winter is over. To date, the grade of nickel assayed is not high but it is possible that large tonnages exist.

BRITISH COLUMBIA—The property formerly known as the *Bismark* group of claims in the Ainsworth mining district is being developed by a new company, *British Columbia Metal Mines, Ltd.* Three adits were opened under previous development and the company will ship silver to the smelter at Trail as soon as the road to the property has been widened. Diamond drilling is being undertaken to test the extent of zinc values. President of the company is C. C. Labrie.

ONTARIO—*Oakridge Mining Corporation*, formerly known as *Oakridge Uranium Mines*, is diamond drilling its newly acquired pyrite property in the Craig and Moncrieff townships west of Sudbury. The company hopes to develop a large pyrite deposit which is said to extend on the surface for a length of 9,000 feet, with widths up to 100 feet. Drill holes will be put down to a depth of 250 feet at 200-foot intervals along the formation. The company is concentrating on the pyrite formation since its uranium property in the Montreal River area proved disappointing.

QUEBEC—Shaft deepening to the 300-foot horizon has been completed by *Bordulac Mines* on its property in Dasserat township west of Noranda. The first of the two proposed new levels has been established on the 300-foot level and crosscutting is going on for an estimated 110-feet south from the shaft to reach and open the main south vein. The company plans to complete about 300 feet of drifting along the downward extension of the vein from the 150-foot level before sinking is resumed to open a third, 450-foot level. Gold and scheelite are the objectives of the work.

BRITISH COLUMBIA—*Sil-Van Consolidated Mining & Milling Company, Ltd.* expects to order a milling unit of 150 tons daily capacity, and provisions will be made for the installation of a sink-float plant at a later date. The mill will probably be placed near the portal of the 3,300 level, in the *Mamie* section of the property. All future efforts will be concentrated on the *Canary-Hummingbird* group. Further development of the Mamie, with its high gold content, and the development of the *Coronado, Victory* and *Silver Lake, Silver Creek*, and *Homestake* groups can proceed when milling operations are thoroughly established. Since the beginning of operations last December, a total of 3,090 feet of crosscuts and drifts, 365 feet of raises, and 116 feet of sideswiping have been accomplished. At least an equal amount of development is required before the workings are in shape to sustain a 150-ton milling operation. This development has been planned and is now in progress.

QUEBEC—The addition of new equipment has increased the capacity of *Ascot Metals Corporation Limited's* mill by 100 tons per day. The new capacity is 525 tons, of which the *Suffield* mine is providing 400 tons daily. During the winter season, broken ore from the Suffield will be stored at the *Moulton Hill* mine by using an old ore pass system and driving a 120-foot raise. This will permit the dropping of the ore to the third level and hoisting to the mill. At the Moulton Hill mine, the ninth level has been reached and development is proceeding. On the seventh level, the drift is now out 800 feet beyond the upper workings of the mine. Drilling on the *St. Cyr* chromite-asbestos property is being continued in a zone which is 450-feet wide. No work is under way on the wholly owned *Albert Metals* properties, including the *Eutis* pyrite-copper property, but there is new interest developing in the use of pyrite for its sulphur content.

BRITISH COLUMBIA—The *Lynn Creek* zinc property, ten miles from Vancouver, has been acquired by *Graham Bousquet Gold Mines* on an option-to-buy basis for a total price of $174,000. The property had been developed by previous operators so the first job will be clean out old workings and trenches.

QUEBEC—A group of 20 claims in the Levy township, Chibougamau district, has been purchased by *Consolidated Astoria Mines* from *McVitte* interests for $15,000. Diamond drilling is planned if exploration proves satisfactory. It is believed that the Campbell Lake fault zone on the adjoining property of *Opemiska Copper Mines (Quebec) Ltd.* may extend across the northwest section of the claims.

BRITISH COLUMBIA—Work on the No. 6 level at the optioned *Spider* group of *Sunshine Lardeau Mines*, located in the Slocan area, is said to have blocked out one of the largest silver-lead-zinc ore bodies found on the property to date. Development is in progress on the No. 4 vein which drifting has opened up a distance of 210 feet from the No. 6 adit portal. The vein was located by drilling last year on No. 5 level. It was picked up 78 feet from the portal of No. 6 and became ore-bearing at 85 feet.

TANGANYIKA—The Government has restricted to 40 percent the amount of newly mined gold which may be offered for sale on the free market. This gold must be processed and must be sold for dollars. The arrangements are said to be temporary.

NORTHERN RHODESIA—The *Rhodesian Section Trust* group may undertake prospecting in three areas outside the established copper belt. They are Mwenilunga, 300 miles west of Chingola; Kadola, south of the copper belt; and Luapula, in the Lake Mweru area. In addition to opening a new mine at Chibulama, the company is also drilling at Baluba, west of Luanshya.

SOUTH AFRICA—The chairman of *Chrome Mines of South Africa, Ltd.*, has expressed great concern over the dwindling supply of trucks available to the company. Although total production of ore had increased for the year ended June 30, the number of trucks amounted to only about 50 percent of those available in the first quarter of the year. The present supply is barely sufficient to meet one-third of actual transportation requirements, he said.

FRENCH EQUATORIAL AFRICA—More copper, lead, and zinc will be supplied to the United States under contracts now being negotiated with the Economic Cooperation Administration. Francs will be advanced to *Societe Miniere du Niari (SMN)* and *Explora-*

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Destined for use in the Transvaal, Union of South Africa, is this Cummins, Diesel-powered, mobile, crushing plant. Designed and manufactured by W. S. Thomas & Taylor, Ltd., of Johannesburg, South Africa, the unit has a feed hopper with a Grizzley 36-inch by 15-inch roller-bearing jaw crusher, powered by a 150-hp, Cummins Diesel, and a 25s Gyratory Crusher with a 10- by 4-foot, 2-deck vibrating screen and retractable and portable conveyors, powered by a 200-hp Cummins Diesel.

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tions Minieres au Congo (EMAC) and dollars will be advanced to the *Mid-African Exploration Company*, agent for SMN and EMAC.

SOUTH AFRICA—Prospecting operations undertaken by *Anglo-Transvaal Consolidated Investment Company Ltd.* at Letaba in the Northern Transvaal indicate the existence of a copper-zinc orebody suitable for small-scale mining.

FRENCH EQUATORIAL AFRICA—The United States and France have agreed to develop jointly a new diamond mine in French Equatorial Africa, according to the *Grivar Exploration and Development Corporation* in New York. The mine is near the Ubangi River, about 220 miles southeast of Berberati. Operations are said to be partly financed by a loan from the Economic Cooperation Administration, to be repaid in industrial stones. Digging is said to have started.

SOUTH AFRICA—The *Namaqualand Copper Exploration and Mining Company, Ltd.* has acquired the control and administration of the *Transvaal Construction Exploration and Mining Company (Ptu) Ltd.* The latter firm has mineral holdings of about 42,348 morgen in the vicinity of Springvok, Namaqualand, Cape Province. Most of this area was prospected years ago and is said to be rich in copper. The company has also acquired licenses to prospect two manganese deposits near Cape Town, and plans to embark upon an extensive prospecting program in the near future to open up the deposits.

GOLD COAST—Exceptionally high values have been obtained at the *Boabedroo* section of the *Konongo Gold Mines*, according to a report from the company. Total development was 936 feet. An abnormally wide orebody was encountered at the 140-foot level (No. 10), probably caused by the intersection of two sets of shears. An examination of the rock in the northeast face and that on the No. 9 level, indicates that the present northeast face is not far from the northeasterly end of the shoot. The lateral extension of the shoot on No. 10 level will therefore be mainly in the southwesterly direction. Developments in the *Odumase* section are described as disappointing.

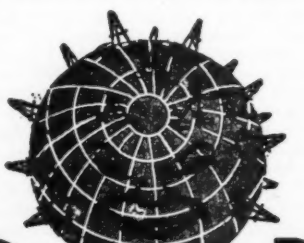
SOUTH AFRICA—*Star Diamonds (Pty) Ltd.* reports that for the year ended June 30, 3,832 feet was developed in the mine. This included driving, crosscutting, raising, and winzing. No. 1 and No. 2 shaft were connected on the first level and sinking of No. 2 shaft to the second level was completed. The second level from No. 1 was driven 1,105 feet toward No. 2. The installation of a used slow-speed steam engine, alternator, and boilers will generate 420 kva. This should provide sufficient power for substantial expansion of the tonnage mined and treated. The mine has been treating about 200 loads per day. Its capacity is 300 loads every 24 hours and every effort will be made during 1952 to maintain that capacity. During the year, *Westar Diamond Mining Company (Pty) Ltd.* was formed to acquire from Star Diamonds the western portion of its property on Farm Wynandsfontein No. 653. The issued capital is £3,600 with controlling interest held by *Selected Mining Holdings, Limited*. Prospecting boreholes show widths substantially the same as those encountered at the Star mine which adjoins the property. A pilot treatment plant is being erected and should be in operation early in 1952.

GOLD COAST—Since the passing of legislation designed to safeguard and to develop the interests of small-scale African diamond operators, it is reported that the African diamond industry has made substantial gains in production and general economic stability. Total production for the first seven months of 1951 was 328,109 carats and it was estimated that if this increase is maintained, the figure for 1950 will be exceeded.

TANGANYIKA—*Uruwira Minerals Ltd.* produced 2,400 tons of lead concentrates during its last financial year. Proceeds from this amount more than covered the cost of underground development.

GOLD COAST—Gold Coast mining, one of the commonwealth's most important industries, has been based on gold, diamonds, and manganese. Recently, a fourth, bauxite, has been added. The report of the Chief Inspector of Mines, C.W.F. Bond, shows that the value of the products for the year ending June 1951 rose by £3,171,363 to £16,567,024. Gold contributed about one half, manganese, one third, diamonds one eighth and bauxite the rest. The output of gold from 10 lode mining companies was 693,721 fine ounces; about 750,000 tons of manganese was produced; and 548,371 carats in diamonds were produced, compared with 978,304 carats in the previous year.

Round the World



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ENGINEERING BOOKS:

Views and Reviews

HYDRAULIC FILLING IN METAL MINES. By William E. Lightfoot. 1951 28 pp., 15 figs. $0.50.

"Hydraulic filling" or what is more commonly known as "sand filling" is that system by which material needed for underground support is supplied as a dense pulp. Formerly the chief reason for its use was the excellent support it provided, but recently its use has been important in reducing mining costs.

The history; properties of fills; application; and techniques of preparation, transportation, and underground implacement are given. A special section is devoted to costs and to those mines using the system in all parts of the world. An extensive bibliography adds to the publication's usefulness.

DIE LAGERSTATTE DER TREPCA UND IHRE UMGEBUNG. By Prof. Dr. F. Schumacher. In German. $2.00.

Dr. Schumacher, formerly Dean of the Freiberg School of Mines, went to Yugoslavia in 1946 on the invitation of the Yugoslavian government and subsequently occupied an important position in the mining industry of that country. Since returning to his native Germany this past summer, Dr. Schumacher has published a very exhaustive review of the history and geology of the Trepca lead-zinc mine in southern Serbia.

Considered to be one of the most interesting and remarkable ore occurrences in the world, the Trepca is a perfect example of a mesothermal metasomatic lead-zinc deposit related to Tertiary volcanic activity. The mine, an important producer since 1930, is now the focal point of Yugoslavia's lead-zinc industry.

DIAMOND DRILL HANDBOOK. By J. D. Cumming Published by J. K. Smit & Sons of Canada Ltd., Toronto, Ontario. In the United States, J. K. Smit & Sons, Inc., Murray Hill, New Jersey. 1951, Cloth bound, 6 by 9 inches, 501 pages, 128 illustrations and 56 tables. $6.50.

The book is written for the engineer and geologist, the student, the mine manager, and the exploration company. It is especially directed to the geologist or field man in direct charge of diamond drilling. The value of the book is enhanced by its complete glossary and the inclusion of many valuable data in the extensive tables. Many of the pictures and sketches show specific examples of how projects are actually accomplished in the field. While the drilling equipment described is primarily used in North America, the principles of diamond drilling apply everywhere.

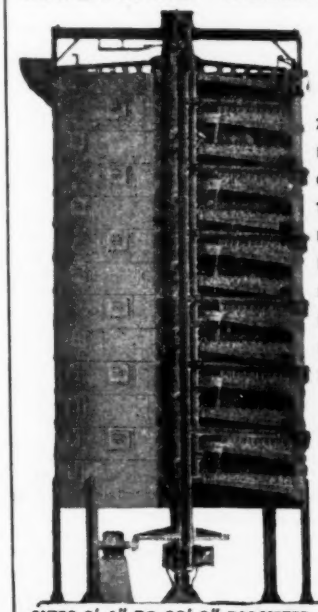
STRATIGRAPHY AND SEDIMENTATION. By W. C. Krumbein and L. L. Sloss, Department of Geology, Northwestern University. W. H. Freeman & Co., San Francisco, California. 1951, Cloth bound, 6 by 9 inches, 507 pages, 123 line drawings. $5.00.

The publication of "Stratigraphy and Sedimentation" brings an up-to-date comprehensive textbook treatment of one of the most rapidly expanding fields of integrated geology. This book assembles and integrates the facts, principles and hypothesis bearing on stratigraphy and sedimentation in a form easily studied by those interested in the subjects.

Copies of any of these books may be purchased from *Mining World*, 121 Second Street, San Francisco 5, California.

PACIFIC FURNACE

MULTIPLE HEARTH FURNACE



ROASTING
CALCINING
DRYING

ZINC ORES	QUICKSILVER
IRON ORES	MAGNESITE
COPPER ORES	LIMESTONE
TIN ORES	MOLYBDENUM
NICKEL ORES	BONE CHAR
LEAD ORES	DIATOMITE
SODA ASHES	LIME SLUDGE
FULLERS EARTH	MAGNESIUM
CARBON	CLAY GRANULES
PYRITE	ANTIMONY

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LEAD CHEMICALS
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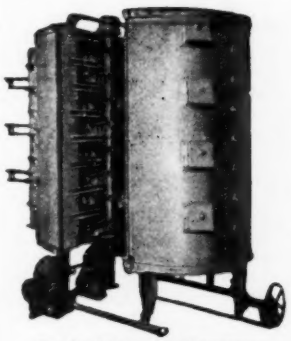
And for Numerous Other Materials

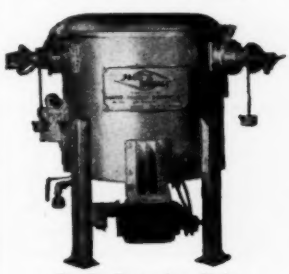
SIZES 8' 6" TO 22' 3" DIAMETER
NUMBER OF HEARTHS, 1-16



Pacific Laboratory Furnace

PACIFIC LABORATORY FURNACE

Manufactured in two sizes—36" and 54" inside diameters having 6-8-10 Hearths and include the same features as the commercial size furnace.



Pacific Furnacing Unit

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PACIFIC FURNACING UNIT

Higher shell height. Three gas burners. Provision for conversion to muffle unit. Small volume roasts at any desired temperature.

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PRODUCTION EQUIPMENT PREVIEW

PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill, or smelter. This PEP section is MINING WORLD'S way of making available to you some of the finest current information on mechanization.

FREE-LITERATURE PREVIEW

To get any item of free literature illustrated or described in the Production Equipment Preview, note the key number of that item, circle the corresponding number on the PEP coupon, and mail it to Mining World, 121 Second St., San Francisco 5, Calif.

WINTER CONDITIONING: To stop those cold weather repairs on your crawler tractors, start a preventive maintenance program now. International Harvester has published a pamphlet that has all the information needed to start a protective service for crawler tractors. Circle No. 23.

CORROSION-RESISTANT PUMP: The bulletin just published by Allis-Chalmers on their new pump designed to handle chemicals, liquors, and corrosive solutions may be obtained by circling PEP No. 9.

ENGINEERING IRONS: The International Nickel Company has published a new 28-page basic reference bulletin on the characteristics and uses of modern nickel cast irons. Circle PEP No. 19.

TRUCK-MOUNTED SNOW PLOWS: A new bulletin describing their complete line of truck-mounted snow plows has been released by the Baker Manufacturing Company. The booklet includes data on v-type, one-way, and reversible tripping blade plows in a complete range of sizes. For more information circle No. 27.

ORE TESTING SERVICES: The Galigher Company has released descriptive literature covering their complete testing services. If your mill and lab problems are causing trouble, get Galigher's new bulletin by circling no. 14.

THICKENERS: The Dorr Company has released a 28-page bulletin in color that covers the major types of Dorr thickeners with text, drawings, photographs, and size ranges. Control devices, special designs and the company's engineering service are explained in detail. For a copy of this informative booklet, circle no. 15.

HARD SURFACING: Stulz-Sickles' hard surfacing welding electrodes are presented in volume 2, number 10 of the Manganal Marketer, recently published. Any steel part that is subject to impact and abrasion has an increased life when hard-surfaced. Manganal build-ups form a protective armor that takes the brunt of initial impact and abrasion allowing the rebuilt parts to workharden before wear starts. Circle no. 2.

POWER TRANSMISSION: Repairs, replacements, and new installations involving power transmission equipment require experience. The Falk Corporation has compiled a bulletin based on over 30 years of work in the mining field that will prove invaluable to operating miners. For your copy, circle no. 7.

HOISTING EQUIPMENT: A new bulletin by the Vulcan Iron Works describes various types of hoisting equipment, including tables showing rope capacities for drum diameters ranging from 9½ inches to 120 inches and tables for calculating rope pull on slopes and inclines. Circle no. 8.

PIPING POINTERS: Due to the demand for the last edition of "Piping Pointers" published by the Crane Company (250,000 requests were received), a bigger and better edition has been compiled. The book is designed to be a helpful handbook for training maintenance workers. It thoroughly covers all the fundamentals of good, sound piping practice with facts and well-illustrated "how-to-do-it" explanations. For a copy of this publication, circle no. 13.

LONGER LIFE FOR TRACK ROLLERS: A revolutionary new track roller for track laying tractors uses dirt-exclusion, "Flow-Away" grease seals. The shaft and dirt exclusion seals are interchangeable for use in "Caterpillar" rollers. Circle PEP No. 1 for complete data.

TIRE MAINTENANCE: According to B. F. Goodrich company, 70 percent of all premature truck tire failures can be traced to the lack of a rigid program of tire maintenance and inflation and the use of improper air pressure. For information on lengthening tire life, circle PEP No. 18.

COMPLETE FIRST AID KIT: A new kit has been announced by the Mine Safety Appliances Company. The kit consists of a canvas pouch that holds gauze roller bandage, adhesive compresses, absorbent gauze compresses, gauze pads, tourniquet, scissors, forceps, Merthiolate applicator vials, MSA Foille burn treatment, triangle bandages, dermal pencil, indelible pencil, injury report cards, and a clip for a flashlight. Further details can be obtained by circling No. 25.

LOW COST MATERIALS HANDLING: Pioneer Continuflo equipment is successfully extending the lives of many old mines on both the Mesabi and Cayuna ranges in Minnesota by profitably handling low grade ores. For further information on the line of feeders, screens, crushers, and conveyors produced by the Pioneer Engineering Works, circle number 30 on the PEP card.

SPECIAL TRACTOR TOOLS FOR MINING: Hyster accessories for Caterpillar tractors, including the "Hystaway" ½ yard excavator and a complete line of winches, yarders, cranes, and donkeys. Provides versatile range of uses in mining operations. Complete literature available from MINING WORLD. Circle No. 34.

SAND PUMPS: For complete literature on a line of sand pumps specifically designed for pumping sands and slurries in mines, mills, and smelters, write to Allen Sherman-Hoff Co., 223 S. 15th St., Philadelphia 2, Pa., or circle No. 36 on the PEP card.

ROLLER CHAINS: Tension linkages, and numerous examples of uses for roller chain are described, illustrated, and cataloged in a new handbook released by Chain Belt Company, 1600 W. Bruce St., Milwaukee 4, Wis. and written for designers of tension linkages. Circle No. 38 for your copy.

BLASTING CAPS: For complete information concerning Du Pont "MS" delay blasting caps in 14 clearly marked delay periods from 25 to 500 milliseconds, circle No. 61.

CONVEYOR BELT IDLERS: Catalog No. 785, published by Jeffrey Manufacturing Co., gives complete information on varied line of belt idlers, self-aligning, pivoted-type return, and many others. For your copy of this informative work, circle PEP No. 70.

PEP Editor January '52

MINING WORLD-WORLD MINING

121 Second St., San Francisco 5, Calif.

Please send me complete and free information on the following equipment described in your PEP section, and keyed by the numbers I have circled:

——→	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
CIRCLE	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
NUMBERS	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
YOU	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
DESIRE	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

Also send further free information on the equipment advertised on page:

_____; Product_____; Manufacturer_____

_____; Product_____; Manufacturer_____

Name_____ **Title**_____

Company_____

Address_____

City_____ **Zone**_____ **State**_____

GEAR DRIVES: Link-Belt Worm Gear Drives of three basic types, each available in 10 different sizes, for fractional or large horsepower, and in speed ratios of 3⅝ to 1 up to 8,000 to 1, are illustrated in a new 80-page Book No. 2324. Circle No. 3.

LOADER: The Joy Manufacturing Company 18-HR-2 loader, designed for high-capacity tonnage in metal and non-metallic mines, is described and illustrated in a new bulletin. Bulletin No. J-108. Circle No. 4.

PORTABLE ELECTRIC SAW: For complete information on Independent Pneumatic Tool Company's new low-priced 6-inch Thor portable electric saw, circle No. 5 on PEP card.

TRUCK BODIES AND HOISTS: Complete information on heavy duty Heil bodies for your off-the-road dumptrucks or earth movers, and Heil hydraulic dumptruck hoists will be sent to truckers who circle No. 6.

DIESEL PROTECTIVE MAINTENANCE: Cummins Engine Company has released a bulletin on their recommended maintenance program for diesel owners. For a copy of Bulletin No. 12, "Protective Maintenance Increases Profits," circle 10.

INCREASE GENERATOR RATING: By blowing hydrogen gas at high velocity through specially-constructed hollow coils in large turbine generators, the cooling medium is brought in direct contact with the copper in which the heat is generated. The rating of the machine can be increased by as much as one-half by such cooling. For further information circle No. 11.

WELDING FITTINGS: Claimed to eliminate the joint failures due to vibration and expansion common to mechanical type joints, the new welding fittings for corrosion resistant coated pipe made by Welstrom are available in all standard sizes and types from one half inch up to thirty inches in diameter. Circle No. 12.

REAR-DUMP EUCLIDS: A 16-page catalog covering Models 31TD and 53TD Rear-Dump Euclids of 44,000 lb. payload capacity has been published by Euclid Road Machinery Co. Circle No. 16 for Form No. 120.

USED MINE AND MILL EQUIPMENT: Denver Equipment Company is expanding and needs all available space. For this reason, much of their used equipment on hand must be sold. For a full description of the items that are offered, circle No. 17.

"MAGIC MARKER": Speedry products have announced the development of a new medium for sketching, writing, and marking on a wide variety of surfaces, both porous and nonporous, in an ink that is instant-dry, waterproof, and launderproof. "Magic Marker" is a throw-away bottle marking unit that writes with a felt tip designed to permit fine, medium, and bold one-stroke marking. Circle No. 20.

DATA BOOK OF STEELS: A new data book tabulating the various classes of steel, their composition, physical characteristics and applications, has been published by the Munitions Board Office of Materials. Copies of this book can be obtained by circling No. 21.

IMPROVED FLOTATION: Increasing recoveries and reducing reagent and power consumption with the improved Fagergren machine. Literature from Western Machinery Co., San Francisco, or from MINING WORLD by circling PEP No. 29.

DUST RECOVERY: Buell Engineering Company has a new bulletin on "The Collection and Recovery of Industrial Dusts." The 28-page book has complete information on systems of recovery that will boost plant yield, improve product and process, and eliminate air pollution. For a copy, circle No. 26.

MINERAL DRESSING NOTES: New booklets by American Cyanamid, 30 Rockefeller Plaza, N.Y.C., or from MINING WORLD, covering Applications of Cyanamid Reagents, Dutch State Mines Cyclone Separation, Heavy Media Separation Techniques. Circle No. 28.

CYLINDERS: Ledeen Mfg. Co., Los Angeles, Calif., manufactures compact cylinders for operation of chute gates, cherry pickers, and for numerous other push-or-pull applications in the mineral industry. Designed for air, water, or oil operation, available for medium, special, and super duties in a wide variety of sizes. Ledeen cylinders and the mountings to adapt them to special uses are described in Bulletin 500. Circle 42.

CONCENTRATE STACKER: The Stephens-Adamson Swivel Piler is a light (approximately 450 pounds) stacker available in either fixed or wheel-mounted units powered by electricity or gasoline. Further information on this compact unit for enlarging your storage or stacking areas is available as "Bulletin No. SA-550." Circle No. 45.

ROD MILLS: Bulletin 25-C released by Hardinge Company discusses rod-mill history, application, general design, grinding action, specific features, and gives specifications, and recommended auxiliary equipment for Hardinge rod mills. Circle 47.

TRACTOR: A new 32-page 2-color catalog, CR-313-A, describes and illustrates the International TD-9 diesel crawler, and gives detailed specifications, job applications, construction and operating features of the 40.5-hp. (drawbar) tractor. Circle 64.

FLEXIBLE VENTILATION TUBING: An informative new 12-page booklet gives detailed information on the installation and use of Bemis Bro. Bag Co.'s Flexipipe for use in ventilating coal mines, metal mines, and tunnels. Circle 66.

CORE DRILL STANDARDS: The Diamond Core Drill Manufacturers Association, 122 East 42nd Street, New York 17, New York, announced the publication of their Standards Bulletin No. 1. The book lists all the various types and sizes of core drill equipment in general use for which standards have now been written in whole or in part. The publication clearly shows these parts with cutaway drawings and nominal dimensions. Copies may be obtained at a cost of 50¢ each from the association at the above address.

DIESELS: "Work-Horse Power" is a new Caterpillar booklet which shows that there is a Cat Diesel for every job: 12 models from the D-311, 47 hp., to the D-397, 450-hp. are described and illustrated. Circle 49.

PIT MINING: A new 6-page, two-color folder released by the International Harvester Company describes "High Production, Low Costs . . . With International Pit and Quarry Power. Form A-317-NN is yours by circling No. 50.

DIAMOND DRILLS: For complete information on Christensen Diamond Products Co.'s line of core bits, concave bits, and reaming shells in all standard diamond-drill sizes, circle 95.

SHOVELS, DRAGLINES: For information on Thew Shovel Company's line of shovels, cranes, draglines, clamshells, and hoes, in a variety of sizes and models that will perform virtually any loading job, circle 67 on the PEP postcard.

NEW THROWAWAY BITS: The Mackintosh-Hemphill Company recently announced a new line of forged steel disposable bits in sizes from 1¼ inches to 2⅜ inches. They claim for the new bit the ability to drill faster with a cleaner, smoother hole and longer bit life. For more information on this new bit circle No. 22.

NEW TEN-YARD, TWO-CRAWLER SHOVEL

Marion's new ten-yard 191-M, described as the world's largest power shovel on two crawlers, was designed to meet the needs of the trend toward larger haulage units previewed in Mining World's Iron Range Edition, October, 1951. It is teamed here with one of the largest truck units developed to date, a 50-ton Euclid rear dump, which it loads in four passes. Many men whose business calls for digging or loading big yardages feel that the introduction of the 191-M is perhaps the most significant single shovel development in nearly a decade. For more information circle no. 85.

STANDARD ENGINEER'S REPORT

DATA

PRODUCT: Chevron Starting Fluid

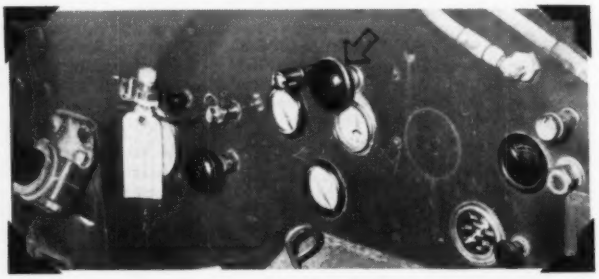
UNITS: Diesel engines

CONDITIONS: Sub-zero temps — high altitudes

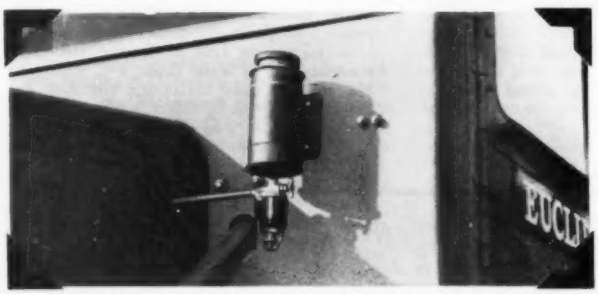
EQUIPMENT: Permanent primers with atomizers on manifolds

FIRM: The Utah Construction Co. Cedar City, Utah

Four hours saved daily starting 13 diesels!

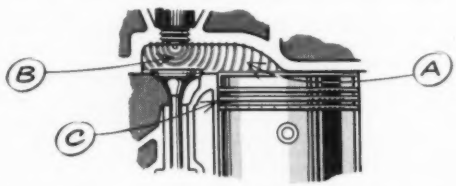


TRUCKS LIKE THIS, when primed with Chevron Starting Fluid last winter, averaged only a minute and a half starting time in temperatures down to 26° below zero. Previously, it took 20 minutes to start each of the 13 units operated by the Utah Construction Co. at mile-high Cedar City, Utah. This meant a saving of four hours a day in starting time alone. A dash-mounted pump (arrow) in each unit forces Chevron Starting Fluid through atomizers into the manifold and primes the engine for fast starting.



STORAGE TANK for bulk Chevron Starting Fluid is here mounted near the engine. The fluid also comes in 7- and 17-CC gelatin capsules. These capsules are placed in a puncturing tool and fluid is pumped into intake manifold the same way as from the central bulk tank shown. Each type of dispensing equipment is suitable for both diesel and gasoline engines and is available from your starting fluid supplier. Chevron Starting Fluid is approved by leading engine manufacturers.

How CHEVRON Starting Fluid Starts Gasoline and Diesel Engines Instantly



A. Atomizes in lowest temperatures and provides powerful, easily ignited vapor in combustion chamber.

B. Pressure, or the weakest spark, fires mixture—turns engine and heats air for regular fuel mixture.

C. Contains lubricant and additives—inhibits cylinder wear and ice formation in primer equipment.

HOT NEWS on COLD ENGINES

FREE BOOKLET gives you more facts on Chevron Starting Fluid—shows where it should be applied in different type engines. Write or ask for it today.

CHEVRON STARTING FLUID

TRADEMARK REG. U.S. PAT. OFF.

STANDARD TECHNICAL SERVICE checked this product performance. For expert help on lubrication or fuel problems, call your Standard Fuel and Lubricant Engineer or Representative; or write Standard Oil Company of California, 225 Bush St., San Francisco.

STANDARD OIL COMPANY OF CALIFORNIA

Motor Grader Operator's Handbook by Caterpillar

Caterpillar has published a new four-color, cartoon-style handbook titled "Motor Grader Operator's Handbook." The booklet, designed for operators and supervisors of grading equipment, describes and pictures blade positions, controls,

13th PASS
A final pass to finish the outside of the ridge completes the terrace in 13 passes or 6½ rounds. Some operators may prefer to vary the above sequence slightly, but this procedure has been found most satisfactory by a number of good terrace builders.

It is suggested that the new operator first spend several hours practicing use of the blade controls, with the machine standing still, before attempting any actual work. Motor graders lend themselves to skillful operation, and the good operator's ability will be quickly recognized. Learn to be a good operator.

turns, methods of ditching both forward and in reverse, sloping high and low banks, scarifying, road-mixing bituminous materials, plowing snow, terracing and many other operations where graders may be used.

Like its forerunner, the Bulldozer Operator's Handbook, this publication will be a valuable aid to all who use earth-moving equipment. A copy of the booklet can be obtained by circling no. 81.

Metals Melted Without Containers or Support!!

A metallurgical technique, still in the laboratory stage but worthy of industry's notice, falls into the same category as the Indian rope trick—except this one is no fake. Like the man who saw his first camel, you won't believe it even when you see it.

The lab model recently demonstrated melted aluminum by placing a solid bar of the metal in a crucible placed below two slightly conical, horizontal coils of copper spaced a few inches apart. A switch was closed and the aluminum literally floated up into space midway between the coils. It began to spin furiously, bobbing slightly as though supported on invisible soft springs. Soon it glowed red, began to soften, and finally turned to a bright liquid. As it did so, it assumed the shape of a rapidly turning toy top. The power shut off, the molten aluminum dropped to the crucible below where it solidified almost instantly.

This amazing process was developed to produce purer high temperature metals like zirconium or vanadium that invariably become contaminated when melted in crucibles. Alloying agents can be added to the molten metal while still suspended and thoroughly mixed by the induced currents.

Concrete Mixer Announced For Underground Mining

The "Rex" Chain Belt Company has created a "Train-Mixer" with its 3½ S Tilter Concrete Mixer for underground construction work. This profitable application has been used efficiently and economically for air-passage construction,

patchwork, and general mortar and cement mixing.

The mixer was relieved of its portable axle mounting and put on its own truck made of 42-inch gauge mine car wheels. A 1½-hp., 250-volt direct current Century motor is used to furnish power to the mixer. The whole unit is moved from place to place by connecting it to a two-way mine locomotive.

This installation has been very successful in doing fast work on mine jobs because of its simplicity and portability. Literature will be sent by circling no. 90.

IH Issues New Booklet On Research Operations

Did you ever want to shorten a year to 500 hours, look through five inches of solid steel, photograph an invisible object, or to make a dime appear 6,600 feet in diameter? These are just a few of the things you can discover how to do in a new 12-page booklet entitled "Organized Curiosity, Inc." It's a picture story of International Harvester's 290-man research team checking the company's products for quality from design to delivery in the $4,500,000 manufacturing research department in Chicago. For copy of bulletin circle 98.

Gooseneck Semi-trailers Use Overhead Dumping Rig

The Easton Car and Construction Company, manufacturers of heavy off-highway truck bodies and trailers, are now building semi-trailers of gooseneck construction employing two of the most popular Easton side-dump body designs.

First of the new gooseneck trailers to be completed is model TL-1015, a lift door side-dump of 15 tons capacity. This unit is designed for service with the Caterpillar DW-10 Diesel tractor.

The lift-door body is especially designed for fixed-point dumping, using the Easton electric overhead dumping system. For more information on the new semi-trailers and the dumping system, circle no. 87.

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"There are many arts and sciences of which a miner should not be ignorant. . . . Without doubt, none of the arts is older than agriculture, but that of metals is no less ancient; in fact they are at least equal and coeval, for no mortal man ever tilled a field without implements. In truth, in all works of agriculture, as in the other arts, implements are used which are made from metals, or which could not be made without the use of metals; for this reason the metals are of the greatest necessity to man. When an art is so poor that it lacks metals, it is not of much importance, for nothing is made without tools. Besides, of all ways whereby great wealth is acquired by good and honest means, none is more advantageous than mining; for although from fields which are well tilled (not to mention other things) we derive rich yields, yet we obtain richer products from mines; in fact one mine is often much more beneficial to us than many fields. Lastly there is the Law, especially that dealing with metals, that he may claim his own rights, that he may undertake the duty of giving others his opinion on legal matters, that he may not take another man's property and so make trouble for himself, and that he may fulfil his obligations to others according to the law."

Georgius Agricola, 1553 A.D. in DE RE METALLICA.
Hoover Translation

A number of times this column has mentioned the position of the mining industry in the industrial picture. We have pointed out that every industry in the country is vitally interested in a steady and adequate mineral output. In fact, if all metal output were cut off it would only be a short time until every other major industry would grind to a stop. In spite of all the talk, agitation and appropriations there is not a balanced stock-pile anywhere in the U. S. Metals "ON ORDER" with delivery within two years will not supply a single gear or cog-wheel today nor tomorrow. Because of the above we are glad to offer the estimate made by Agricola just 500 years ago. He stated an axiomatic truth which has been a constant truth ever since. The miner may well be proud of his trade.

During the last three months we have spent hours trying to get some understanding of the mass of regulations being issued by the present alphabetical hash, but we are frank to confess that we are still wandering in a mental jungle. History repeats itself as we remember the confusion among the different Bureaus in Washington when they began buying minerals and metals during World War II. Many of our miners must have formed permanent bald spots as they scratched their heads while trying to understand the many regulations covering metals production and marketing. Even the more simple rules of the Henderson-Jones Premium Price Plan bothered us until actual operation solved some of the difficulties. We smile as we are reminded of parts of a ribald jingle of that day:

"When they'd start to worry, stew, and fret
I'd get them to chanting the alphabet.
With the A. A. A. and the N. L. B.
The W. P. A. and the C. C. C.
With these many units I got their goats,
And still I crammed it down their throats.
My workers worked with the speed of snails
While the taxpayers chewed their fingernails."

The Wanderer

precipitates—CENTRAL and EASTERN

Huge RFC Loan For Michigan Copper Deposit

A loan of $57,185,000 has been approved by the Reconstruction Finance Corporation to bring into production the White Pine Copper deposits in the Upper Michigan Peninsula area. The loan is the largest made by the RFC since World War II.

Recipient is the White Pine Copper Company, a subsidiary of the Copper Range Mining Company, owner of the property in Ontonagon county, Michigan. The firm diamond drilled the area in 1949 and reported estimated reserves of 309,660,000 tons of ore, averaging 21.3 pounds of copper to the ton or a little over 1 percent. The average yield for other copper ore in the United States is slightly less than 1 percent.

A complete mine, including shafts, smelter, steam power plant, townsite, and 19 miles of railroad, will be built. Ultimately, about 10,500 tons of ore will be produced daily. It is expected that within 36 months a goal of 70,000,000 pounds of copper output annually will be reached.

Kaiser Plans Largest Aluminum Reduction Plant

Kaiser Aluminum & Chemical Corporation plans to double its aluminum reduction plant and power facilities now under construction in the New Orleans area. The Government has agreed to purchase five full years of production from the new 100,000 ton-per-year plant, if it is not otherwise marketed by the corporation commercially. Total cost of expansion will be $100,000.

Specifically, plant capacity will be increased to 200,000 tons annually, making it the largest aluminum reduction plant in the United States. Four potlines are to be added to the four already under construction. Additional power facilities will be built to increase the capacity of the company's own power plant in the area to 478,200 kilowatts.

The Kaiser alumina plant at Baton Rouge will increase its capacity to 60 percent over original design, so that it will produce 800,000 tons of alumina annually.

Facilities will be added to increase bauxite production at Kaiser's deposits in the British West Indies.

EASTERN STATES

The *Pilgrim* mine near Gaylesville, Alabama, has been reopened and is now producing about 60 tons of iron ore a day. Idle since the recent death of J. A. Pilgrim, the mine is now being operated by Hubert Pilgrim, in partnership with T. J. Espy under the corporate name of *P & E Mining Company*. The ore is said to grade about 50 percent iron, and its output is going to *Republic Steel Corporation* at Gadsden, Alabama.

The *Pennsylvania Salt Manufacturing Company* will add new facilities to its Calvert City, Kentucky works, including an electrolytic chlorine-caustic soda unit, at an estimated cost of $8,000,000. As the first step, Pennsalt completed a hydrofluoric acid and sulphuric acid plant in 1949 on its Tennessee River location near TVA's Kentucky Dam. These facilities were expanded by the addition, in 1950, of a unit to produce end products from captive hydrofluoric acid and, now nearing completion, a 33 percent increase in hydrofluoric acid capacity. Addition of the new unit will combine at one works, four basic chemicals—hydroflouric acid, sulphuric acid, chlorine, and caustic soda, the first combination of these four products in one works in the United States. Preliminary work has started and it is expected that the new plant will go into operation in early 1953.

Several Henry Krumb scholarships will be awarded to students who are candidates for the B.S., E.M., or M.S. degrees in Mining Metallurgy and Mineral Engineering at *Columbia University School of Mines*. Value of each scholarship is $1,000 per year, plus traveling expenses to New York from points within the United States. Write to the Office of University Admissions, Columbia University, New York 27, New York for application blanks and additional information.

In a contract with the *American Zinc Company of Tennessee*, the *DMPA* has agreed to buy up to 7,200 tons of slab zinc produced by the company in the next three years from new facilities to be built near North Friends Station, Tennessee. The government will pay 17 cents a pound, provided the company cannot sell it to users in this country at a higher price. In return, the company will expand its mining and refining facilities at a cost of $340,000. The agreement will end two years after the date the new facilities begin production, or three years from the present date, whichever is earlier.

A *U.S. Bureau of Mines* office has been established at Boston, Massachusetts, to conduct a special survey of mineral resources of the New England States and New York. The Bureau of Mines has been authorized by the Department of Interior to undertake this study for the *New England-New York Inter-Agency Committee*. The Bureau will prepare several sections for the Mineral Resources Work Group of the Committee, such as a history of the mineral industry of the region, a commodity-by-commodity study of the mineral industry technology, and economy, and economics of the mineral

CF&I BUYS BROOKE IRON COMPANY

A recently approved merger between E. G. Brooke Iron Company and Colorado Fuel and Iron Company transfers all of Brooke's assets to CF&I in exchange for common and preferred stock. Included in the arrangement is Richards Ore Company, a Brooke subsidiary, which operates an iron mine at Wharton, New Jersey. The Richards mine headframe and mill (shown above) have recently been revamped and rehabilitated. The property now provides a dependable source of 185,000 tons of high-grade magnetite and magnetite concentrate annually. Brooke operates a blast furnace at Birdsboro, Pennsylvania; CF&I, one of the nation's largest steel companies, operates steel plants at Pueblo, Colorado, Buffalo, New York, and Claymont, Delaware, as well as six steel manufacturing plants in Massachusetts, Pennsylvania, and California.

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industry. Hugh P. Nicholson, mining engineer of College Park, Maryland, will head the staff. Offices are in the Cummings Building, 261 Franklin Street, Boston.

An agreement between the new *Defense Materials Procurement Agency* and the *National Zinc Company* of New York is expected to assure the United States Government 20,000 additional tons of slab zinc for stockpiling and other defense uses. The zinc ore is to be produced from deposits located near Monterrey, Mexico. A $450,000 concentrating plant will be built there, under terms of the agreement. Processed ore will be shipped from Monterrey to the company's smelter at Bartlesville, Oklahoma for refining. DMPA will buy a monthly average of 600 short tons at 16½ cents a pound, provided the company cannot sell it to industrial users in the U.S. at a higher rate.

Construction of *Fabrikant Steel Products, Inc.'s* new $1,000,000 steel mill at Albany, New York, will be the first major new steel plant development in eastern New York state in over 30 years. Ground has been broken for the plant on a 10-acre plot. Construction will start early in 1952. Principal output will be electric furnace and rolled steel products.

Revisions of pension plans for salaried employes have been under consideration by stockholders of *St. Joseph Lead Company* and *Kennecott Copper Corporation*. St. Joseph asked its stockholders to vote on an amendment providing widows' annuities for widows of the company's salaried employes, subject to certain conditions. Kennecott stockholders approved an amendment to their retirement plan which added a non-contributory section; changed to some extent the contributory section; and was extended to cover all salaried employes regardless of annual salary, with some minor exceptions.

IRON RANGES

The *M. A. Hanna Company* has started some of its winter operations and has made plans for others. New tailing basins will be built at the *Mesabi Chief* and *South Agnew* mines, while additions to the present tailing basins will be made at the *Weggum* and *Perry-Wyman* mines. Construction of the new heavy-media plant at the Mesabi Chief will be carried on all winter so that the plant will be ready to treat ore by May 1, 1952. It will contain sizing screens, two Hardinge drum separators, wash screens, a densifier, and magnetic separators. Tailing will be conveyed from the plant by belt and deposited in the tailing area by means of a stacker. The new *Enterprise* mine, located north of Virginia, Minnesota, is being prepared for stripping. Shop and surface buildings are under construction and actual stripping operations are scheduled to start in the spring. Stripping and mining will be done by power shovels and heavy-duty trucks. The washing plant at the *South Agnew* mine shut down for the winter on October 30. Ore and concentrates from stockpiles were shipped intermittently during November, while rock and surface stripping was also carried on. At the *Morton* mine, surface stripping operations continue with the 1150-B dragline working 21 shifts per week. A 6½-yard shovel has been surface stripping in the east end of the pit. A 9-W dragline and a 6½-cubic

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yard electric shovel are engaged in surface stripping on a 20-shift-per-week basis at the new *Carlz* mine, near Nashwauk, Minnesota. In the Cooley, Minnesota district, the *Harrison* washing plant finished operations on October 21 and plant repairs were begun. The Patrick mine washing plant finished operations for the season on October 14, and the Patrick fines plant ceased operations on October 28. Stripping of surface and rock is being carried out in the Patrick and *Kevin* open pits on a 20-shift-per-week schedule.

The *R. Maturi Corporation* of Chisholm, Minnesota is offering a new magnetic survey service to the mining industry. The method involves taking a vertical aerial photograph of the property to be examined and enlarging it to give a scale of 200 feet to the inch. Using locations taken from the photos, the firm then takes its magnetic surveys into the field with an Arvela magnetometer. From this, a magnetic contour map is drawn to the same scale as the aerial photograph. The system eliminates line brushing and expensive field surveys, making possible a greater number of magnetic readings at a lower cost.

The *Oliver Iron Mining Company* will reopen the *Leonidas* mine near Eveleth, Minnesota. Idle since 1943, the mine has only been operated underground. It contains an estimated 6,700,000 tons of iron ore, half of which is underground ore, and half of which is open-pit wash ore. The wash ore will be transported from the Leonidas property eight miles by rail to the company's *Mountain Iron* mine where a beneficiation plant is in operation.

Zontelli Brothers were granted a lease on two undeveloped iron mining properties just north of Crosby, Minnesota, in Crow Wing county.

The cold weather brought an early end to lake shipping operations. The *Northern Pacific Railway* ore docks at Superior, Wisconsin finished their 1951 shipments of iron ore on November 21. The last vessel loaded was the Henry Ford II. The ore docks at Ashland, Wisconsin also finished operations for the season on November 21 with the loading of the steamer Shasta.

Cleveland-Cliffs Iron Company has announced a three-year $45,000,000 expansion program, $28,000,000 of which will go toward expanding production from new mining properties and replacing mines now being exhausted. A further $13,500,000 is to be spent for a new ore carrier, purchase of a Victory ship and its conversion to an ore carrier, and repowering of other ships.

Duluth, Mesabi & Iron Range Railway Company has ordered 250 70-ton hopper cars from Pressed Steel Car Company. The railway's No. 1 ore dock at Two Harbors, Minnesota. will be remodeled. Plans call for new hoisting machinery of increased capacity, new and wider doors and wider and longer spouts. When completed, this should be the fastest ore-loading dock on the Great Lakes.

Northern Testing Laboratory, Inc. is a new firm on the Mesabi Range organized to test crankcase or lubricating oil in all kinds of Diesel-powered equipment. An oil sample is taken from tractor or truck motors at certain intervals. The sample will indicate a leak in the motor head allowing seepage of water or anti-freeze into the crankcase. The service is a guide to owners of equipment. Peter E. Bye, Chisholm, Minn. is president and Don J. Mathers, Virginia, Minn. is secretary-treasurer of the firm.

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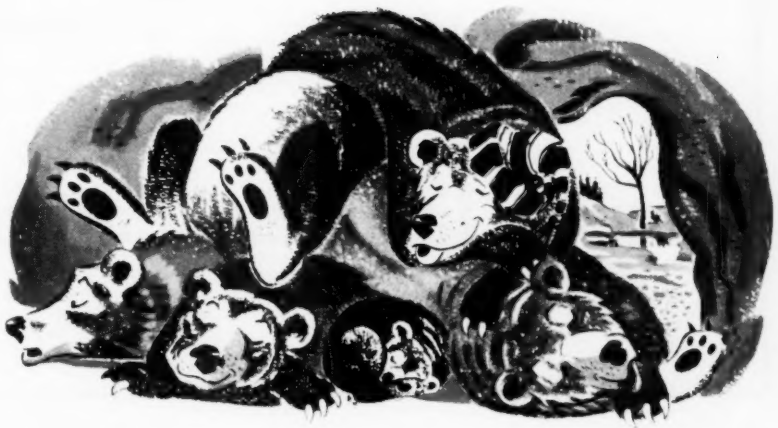

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Hecla Will Develop Banner-Idaho Claims

Helca Mining Company will develop five claims of the defunct Banner-Idaho Mining Company in the Coeur d'Alene district of Idaho.

Hecla and Silver Banner Mining Company had both submitted bids for development of the Banner, Oregon, Puzzler Boy, Snyley, and Sister Roary claims in Shoshone county. The Superior Court of Idaho approved the Hecla contract after Silver Banner withdrew.

Under terms of the agreement, Hecla will pay Banner-Idaho stockholders $7,000 to meet receivership expenses and will give Banner 35 percent of the smelter returns. Development work is to start within a year.

Montana Fluorspar Deposit To Be Investigated

A toy box of mineral specimens recently led to staking a high-grade fluorspar deposit in Ravalli county, Montana, according to M. E. Volin, chief of the Bureau of Mines' Northwest mining division.

The deposit was located by a Hamilton, Montana, man who saw a sample of green fluorspar in the specimen box. Although a well-travelled forest trail cut through the large outcrop, it had not previously been recognized as fluorspar because it was the green variety instead of the common purple variety, Volin said.

The Bureau of Mines has bulldozed a four-mile road to the property and is sampling and evaluating the deposit.

Sunset Minerals, Inc., another Pine Creek property, reports that an improved labor supply has permitted increasing production to near-capacity of 120 tons daily. Lessees are working the company's adjoining *Proctor-Knott* property acquired last July.

More mining claims have been located in the Coeur d'Alene mining region this year than in any recent year, according to filings with the Shoshone county auditor. A total of 520 claims had been filed up to mid-November. More than half (273) were located in the Hunter mining district, near Mullan, Idaho.

Diamond drilling in the southwest workings of *Coeur d'Alene Mines Corporation* under *American Silver Mining Company* ground has disclosed silver-copper ore 100 feet below the 2,800-foot level. According to Dr. H. C. Mowery, president of Coeur d'Alenes Mines, core recoveries indicate that the mineralized structure is about six feet wide at the lower elevation. The vein was developed by drift work on the 2,800-foot level. It contains ore over widths up to four feet for about 150 feet. A raise has been started to test the strength and persistence of the shoot upwards.

Clayton Silver Mines, Custer county, Idaho, has installed three Diesel power units to supplement its water power plant. Deepening of the Clayton shaft 150 feet to the 550 level is under way without interfering with current production.

Silver Star-Queens Mines recently put on a second shift at its property near Hailey, Idaho, to push its search for the lost *Minnie Moore* vein which yielded more than $10,000,000 worth of silver in the early 1900's before being cut off by a horizontal fault.

Hecla Mining Company has completed extensive improvements to the 9,000-foot *Atlas Mining Company* adit in the Mullan, Idaho area of the Coeur d'Alenes and is preparing to install a new 400-horsepower hoist preparatory to shaft deepening operations. A Diesel locomotive has been placed in service underground.

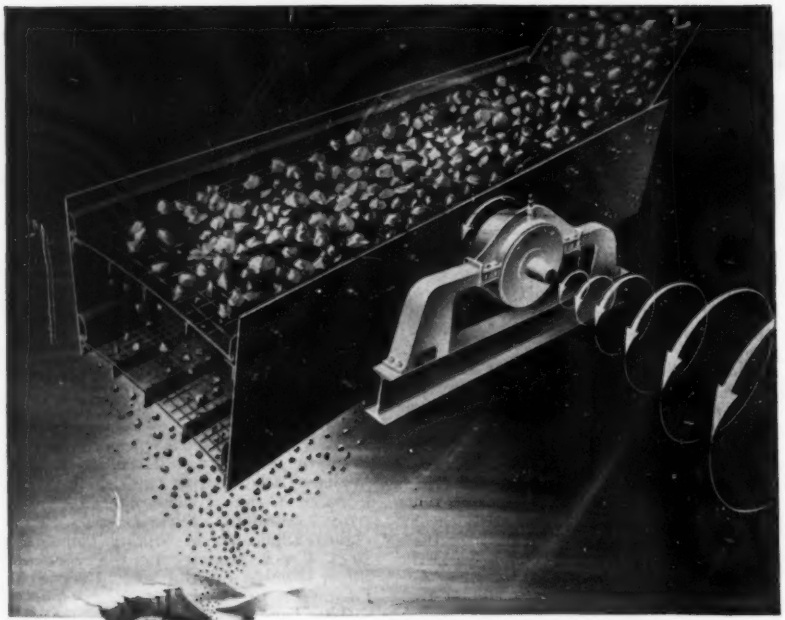
Federal Mining and Smelting Company will deepen the shaft of its *Frisco* mine, one of the oldest mines in the Coeur d'Alene mining district. General Manager J. E. Berg, Wallace, said a new 2,400 level will be opened 200 feet below the present lowest level. A big producer from 1897 to 1906, the Frisco was acquired by Federal in 1912 and operated a short time in 1915-16. Then it lay idle until 1942, except for small leasing operations, when the company started unwatering and rehabilitating old workings. Last year zinc-lead-silver ore was produced from the 600 level on down and earnings totaled more than $600,000 before depletion, depreciation and taxes.

It is reported that property of the *Western Silver-Lead Corporation* near Wallace, Idaho, may be developed by a major Coeur d'Alene operating company. Western Silver-Lead's twelve claims adjoin *Hecla Mining Company's Rock Creek* property on the west and *Silver Buckle* on the east. George M. Grismer is president.

The *Defense Minerals Administration* announced the following grants for exploration and development of strategic minerals: *Bradley Mining Company*, $73,026 on a $97,368 antimony exploration program at its *Yellow Pine* mine near Stibnite, Idaho; Donald D. Hani, $17,000 on a $34,000 lead-zinc-copper exploration contract at the *Hani* mine in the Alder Creek district, Custer county. Other DMA projects include *South Mountain Mining Company*, $36,260 lead-zinc-copper project in Owyhee county; Heber S. Steen, $30,000 copper project in Lemhi county; L. S. Bennett and E. F. Hicks, $5,000 lead-copper project in Bear county; and Oscar V. Svensson, $2,445 antimony project in Elenore county.

MARTIN MINING CO. ERECTS 60-TON MILL

The Martin Mining Company operates this new 60-ton mill at its Martin mine in the Hog Heaven district of Flathead County, Montana. Ore is now trucked ¼ mile from the upper workings of the mine and the mill is producing a single copper-silver concentrate. To handle the lead-zinc ore found in the lower workings, a second bank of flotation cells will be added to the mill circuit. Future mine plans call for driving a crosscut from the main adit in the upper workings to a point under the crude ore bin of the mill, raising from this point to the surface, dewatering the shaft leading to the lower workings, and connecting the upper and lower workings so that all ore may be hoisted directly to the mill. According to Superintendent Waino Lindbom, surface work can then be kept to a minimum and year-around operation will be secured.



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New Era Mines, Inc., of Kellogg, Ida[illegible], has been incorporated by Walter H. H[illegible] son of Wallace, and C. Whalen and P[illegible] Holtz, both of Kellogg. The firm [illegible]s capitalized for $750,000.

Gibbonsville Mining and Explorat[illegible] Company is seeking a $62,000 producti[illegible] loan from the DMA. The funds would [illegible] used to construct a 400-ton plant wh[illegible] would process a large tailing deposit a[illegible] cumulating in the South Fork of t[illegible] Coeur d'Alene River below Smeltervil[illegible], Idaho. It is estimated that about 140,0[illegible] tons of tailings is involved, from whi[illegible] about 2,500,000 pounds of lead, and 2,235,000 pounds of zinc could be re-covered and delivered to defense agencies. Walter C. Clark is president of Gibbonsville and Frank Eichelberger is general manager.

Recently incorporated in Boise, Idaho, were *Northern Mining Company* and *Empire Silver Lead Corporation*. F. E. Scott, Jack Gay, and M. G. Grant organized Northern Mining with a capitalization of $150,000; Mr. Scott and Mr. Gay, together with Jack E. Scott, incorporated Empire with a capital of $500,000.

An unexpected vein of gold-bearing ore has been intersected in the deep-level haulage tunnel being driven by *Goldstone Mining Company* at its property near Salmon, Idaho. The structure is said to be three feet wide and to have the same appearance as the main Goldstone vein which is the objective of the new lower tunnel. Before continuing on to the main vein which is about 1,000 feet ahead, plans will now call for drifting a short distance each way from the crosscut.

The Idaho Bureau of Mines and Geology reports finding "significant quantities" of columbium-bearing minerals in Idaho's *Garden Valley* district. The Columbite mine was found to contain both columbite and samarskite, the latter containing "notable percentages" of uranium.

An average of 30 tons daily is being produced from the Golconda vein on a winze level 150 feet below the main haulage tunnel of *Golconda Lead Mines*, Wallace, Idaho. Work is also being c[illegible]ried on in the *Square Deal* ground operated by Golconda. A 200-ton concentrator is running at daily capacity milling the company's ore, and custom ore from *Lucky Friday*, *Sunset Lease*, and others.

Spokane-Idaho Mining Company will develop the old *Douglas* mine on Pine Creek, Idaho, under terms of an agreement reached with *Douglas Mining Company, Ltd.* The property, which adjoins Spokane-Idaho's *Constitution* mine, consists of 17 patented and one unpatented claim. Underground workings total more than 5000 feet, including a 330-foot inclined shaft. The agreement is subject to ratification by Douglas Shareholders at their annual meeting.

General Mines Corporation of Spokane, Washington, has opened up 60 feet of ore in a west drift from the bottom of a recently dewatered 200-foot shaft on its *Pine Creek* property near Kellogg, Idaho. Ore is being stockpiled for future milling and a flowsheet is being designed for a proposed concentrating plant. Work has been resumed on the ventilating raise from the main working tunnel to the surface. Now up 75 feet, the raise has some gold-copper-silver ore in the back and is believed to be coming into the first of three veins which, it is expected, will be cut by the work.

Mascot Mines, Incorporated, has reported a larger and richer orebody encountered sooner than expected on the new 9th level of its *Little Pittsburgh*

mine Pine Creek, Idaho. At 130 feet from the shaft, the Little Pittsburgh vein system was intersected. This crosscut has now been advanced to 158 feet and it is expected that the full width of the structure has not yet been exposed. Station cutting on the No. 10 level is also reported. Mine production of about 70 tons daily has been maintained since the first of the year, while the mill is now handling about 120 tons per day. Mascot Mines operates the mine under a lease agreement with *Pine Creek Lead-Zinc Company*, owner of the property, and also holds an option to purchase controlling interest in the Pine Creek firm.

OREGON

Discovery of a new chromite ore body at the *Black King* mine in Josephine county, Oregon, has been reported by Donald A. Foster. Surface mining is planned.

A cinnabar ore strike on Deer Creek, Grant county, Oregon, is reported by the *Oregon State Department of Geology and Mineral Industries*. Lawrence N. Roba, Canyon City, Oregon, made the discovery. A retort has been installed on the property.

Oregon's *Department of Geology and Mineral Industries* has moved its offices from the Woodlark Building in Portland, to 1069 State Office Building, 1400 S.W. 5th Avenue, Portland 1. F. W. Libbey is director.

MONTANA

The government's domestic manganese purchasing program got under way with the opening of receiving depots in Butte and Philipsburg, Montana. Only ore containing at least 90 percent of the manganese as carbonate is acceptable, according to O. C. Bradeen, regional director, *General Services Administration*, Seattle. Carbonate manganese producers of Granite, Ravalli, and Powell counties will ship their ore to *Taylor-Knapp Company* in Philipsburg; other producers will ship to *Domestic Manganese Development Company* in Butte. Producers must notify S. A. Brown, GSA representative at the Butte depot, before starting shipments. They should furnish 200- to 300-pound ore samples so that it can be determined in advance of shipment if the ore is amenable to beneficiation. Registrations of producers will be accepted until June 30, 1952, at Bradeen's regional headquarters in the Federal Building at Seattle.

Columbia Mining Company has been granted a $12,158 DMA loan on a $24,318 copper exploration project at *Copper Cliff* mine, Lewis and Clark county, Montana. J. E. Hall of Ogden, Utah, will receive $10,642.50 under a $21,285 contract for copper exploration on Revais Creek in Sanders county. Albert and Jewell Dance of Townsend, Montana, will explore for lead-zinc in the *Whitehorse* and *Emma* mines under a $17,940 contract, while William Mulcahy will explore for lead in Jefferson county under a $5,092 contract. A $50,000 lead-zinc exploration project at the *Star* mine, Neihart, Montana, has also been approved. Lewis B. Stark is owner.

John Listle, Los Angeles, recently took up an option on the eight-claim May Day group of mining claims, three miles southwest of Boulder, Montana, and plans to develop a surface showing of uranium-bearing ore.

Ore is now being mined from two new stopes of the *Nancy Lee Mines Inc.* property near Superior, Montana. A fourth stope has been discovered during an extensive long-hole drilling program. Ore of sufficient tonnage from these stopes will keep the 125-ton concentrator operating on a permanent basis. A geological survey of the property is said to indicate that there are five big ore zones on the 1,400-acre property. Present work is confined to one of these zones.

WASHINGTON

Addy Mining Company has received DMA approval for a $21,290 tungsten exploration project at its property near Addy, Washington, in Stevens county.

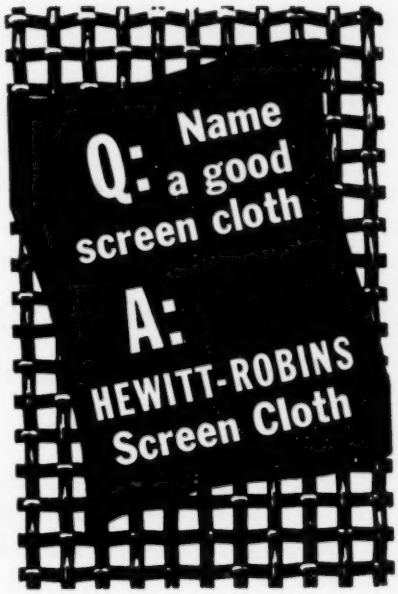
S. J. Holden of Cle Elum, Washington, and his associates will receive $3,800 from DMA on a $7,600 contract calling for exploration for copper in the *Pickwick* mine in the Leavenworth mining district of the Cascades, Washington.

Pend Oreille Mines has completed a 50-unit low-cost rental housing project at Metaline Falls, Washington, in connection with its plans to increase zinc-lead production to 3,000 tons daily. The firm also owns a 57-apartment building in Metaline Falls.

Sullivan Mining Company recently started trucking zinc-lead ore from its Metaline, Washington, development project to the Josephine mill of *Pend Oreille Mines and Metals Company* near Metaline Falls. A 3,500-ton stockpile was built up during development of an ore body in *Metaline Contact Company* ground held under lease by *Metaline Mining and Leasing Company*, which has an operating agreement with the Sullivan firm. R. W. Neyman, Wallace, Idaho, general superintendent for the firm which is jointly owned by *Hecla* and *Bunker Hill & Sullivan* mining companies, said ore has been opened on three levels since a development agreement was signed in March of last year.

Lessees recently started stoping ore at the old *Mohawk* mine three miles northwest of Conconully, Washington. Ore assaying about 60 ounces of silver to the ton, and carrying additional values in gold, lead, copper, and zinc, is being stockpiled, according to C. L. Butler, in charge of operations. Ore is lowered to a new ore bunker by skip over a new 750-foot track tram. The property is owned by *Sunny Peak Mining Company* of Spokane.

Kaiser Aluminum & Chemical Corporation is constructing a cryolite recovery plant at its aluminum reduction plant in Mead, Washington. The new plant is expected to recover part of the cryolite used in the aluminum reduction process. Cryolite is absorbed in the carbon lining of the giant pots in the reduction plant. The new plant is designed to process scrap pot lining so that the cryolite can be recovered.



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Rico Argentine Seeks Market For Pyrite

The Rico Argentine Mining Company operating lead-zinc-silver mines at Rico, Dolores county, Colorado has developed several million tons of pyrite. Shipments have been made to uranium-vanadium plants at Durango, Colorado, and Monticello, Utah, where the pyrite is used as a source of sulphur in roasting roscoelite and carnotite ores. The company is now undertaking studies to determine other uses for its pyrite.

Operations at Rico continue at capacity and 1951 earnings are about double those of 1950, permitting the company to increase dividend payments and to declare a stock dividend of 10 percent. In Rico, 10 five room houses and six double houses have been completed for employees. Due to suspension of railroad freight shipments from Rico, the company is trucking its lead concentrate to the Midvale, Utah plant of the United States Smelting Refining and Mining Company. Zinc concentrate is trucked to Crescent Junction, Utah for rail shipment to Anaconda Copper Mining Company's Great Falls, Montana zinc plant.

ASARCO Modernizes Arkansas Valley Plant

The Arkansas Valley lead smelter of the American Smelting and Refining Company at Leadville, Colorado is now operating two blast furnaces, Nos. 3 and 5. Each furnace is treating about 250 tons of charge per day. Average tonnage smelted in 1950 was 3,600. The recently rebuilt No. 5 furnace was lighted in October, and its operation will increase the monthly tonnage.

Over 700 lots of base bullion were shipped to ASARCO's Omaha, Nebraska refinery during 1951. Each lot consisted of six cakes of bullion. The 3 by 8 by 1.25-foot cakes each weigh from seven to nine tons. A total of 274 men are employed in the plant and 51 in a supervisory capacity under the direction of Leo Hennebach, superintendent and Thomas Fahey, assistant superintendent.

Modernization of the plant is well under way. Polyclone dust and smoke collectors have been installed on the two Wedge roasters and Rotoclone collectors on the Dwight-Lloyd sintering machines. Fume and smoke from the collectors is discharged into an 11- by 12-foot flue, 1,100 feet long leading to the Cottrell plant. A new ventilation system is to be installed in the blast furnace building and in the new dross reverbatory building.

The new Carlton mill of the *Golden Cycle Corporation* is now treating 700 tons of Cripple Creek district gold ore daily. A total of 69 men are employed at the mill under the direction of Howard R. Kell of Cripple Creek. Max W. Bowen is Golden Cycle's vice president and general manager in charge of all mining in the district and the new mill.

Fred Rice and Charles N. Scott of Leadville, Lake county, Colorado, are operating the *New Monarch Leasing Company* under a lease from the *Monarch Mining Company* and the *Resurrection Mining Company*. A new development program has been started on the sixth level of the Monarch shaft under the supervision of Scott. A cross cut has been driven 170 feet northeast of the shaft to a mineralized fissure. Mill grade lead-zinc sulphide ore over a width of five feet was found in the fissure. Present plans are to drift about 1,500 feet on this fissure.

The *Dragon Consolidated Mining Company* is now producing about 8,000 tons of halloysite clay a month at its *Dragon* mine at Eureka, Juab county, Utah. About 150 tons of clay is mined each day from the mine's new open pit and the remainder is mined by underground methods. Openpitting has reached a depth of 60 feet and the pit will be deepened to 120 feet before the waste-to-ore stripping ratio is too great to permit profitable mining. Four benches have been established in the pit and the clay is loaded into trucks by a 1½-yard electric shovel. James J. Lillie is company vice president.

Silver King Coalition Mines Company operating lead-silver-zinc mines in the Park City, Utah, district reports net profits of $213,415 for the year ending September 30, 1951. This compares with a net loss of $251,416 (including shutdown costs) for the previous year ending September 30, 1950.

The *Park Utah Consolidated Mines Company* has discovered a promising lead-silver-zinc ore body in sinking its new No. 5, four-compartment shaft in the *Ontario* section of its Park City, Utah, properties. The announcement was made by Paul H. Hunt, vice president and general manager. Two additional ore bodies have also been found on the 1400- and 1500-foot levels. The ore bodies have been found as "vein dikes" along the hanging walls of premineral porphyry dikes crossing the sedimentaries. This is the first known instance of this type of ore body in the district and will have an important bearing on future mine development. Net profit, before depletion, for the company for the nine months ending September 30, 1951 was $93,-702.62. Despite the higher prices (two cents per pound) for lead and zinc, the company's earnings are not expected to rise in the fourth quarter because of increased labor and supply costs.

Production of 30 tons per day of uranium-copper ore is being made by Copper and Bronson from their *Happy Jack* mine in White Canyon, San Juan county, Utah. The ore is trucked to the Hite, Utah, mill of the *Vanadium Corporation of America*. Grant Bronson is superintendent and Warren Bronson, foreman.

The *United States Atomic Energy Commission* has installed a portable two-way radio transmitter and receiving set at its field headquarters at White Canyon, Utah. White Canyon is in an extremely rugged and remote part of southern Utah and the radio permits communication with AEC headquarters at Grand Junction, Colorado. It can also be used to transmit emergency messages for help or aid in the event of an accident.

The *Harrington Mines Company* is shipping five to 10 railroad cars of lead-zinc-copper-silver-gold ore to the Tooele, Utah, smelter of the *International Smelting and Refining Company*. The ore is mined from a bedded deposit in the *New Majestic Mining Company's* mine near Milford, Beaver county, Utah. Harrington Mines leases the property from New Majestic and is sinking a winze below the 500-foot level to develop sulphide ore in limestone.

A preliminary estimate of copper production (540,000,000 pounds) during 1951 by the Utah Copper Division of the *Kennecott Copper Corporation* has been made by J. P. Caulfield, Utah Division general manager. To recover this copper, Utah Copper Division stripped 45,000,-000 short tons of waste and mined and milled 30,000,000 short tons of ore. This is the largest amount of material moved in any year. During World War II when copper production was at a peak, the average tonnage of ore and waste from the *Bingham* open pit mine was 65,000,-000. Mill heads during the year averaged about 0.95 percent copper and the cut-off point between waste and ore was 0.40 percent copper.

An extensive exploration and development program has been started on a nitrate deposit in Escalante Valley near Beryl Junction, Iron county, Utah. Equipment has been purchased for a pilot plant and research laboratory in Beryl Junction. All development work and pilot plant operation is under the direction of Leroy J. Bailey who was formerly in the research department of the *American Potash and Chemical Corporation* at Trona, California.

The *Bowles-Heflin Mining Company* has received the first *Defense Minerals Administration* exploration loan granted to a Colorado Plateau uranium-vanadium producer. Bowles-Heflin is operating the leased *Yellow Circle* group of claims as well as company-owned claims, near Moab, Grand county, Utah. The loan amounted to $18,994 and will be used to drill an estimated 25,500 feet of dry non-coring prospect holes from the surface of the company's 150 claims in the Cane Springs district. A wagon drill will be used for exploration which probably will take 12 months to complete with a crew of three men. Melvin C. Bowles of Moab is mine superintendent for the company and A. L. Heflin of Aurora, Colorado, is a partner.

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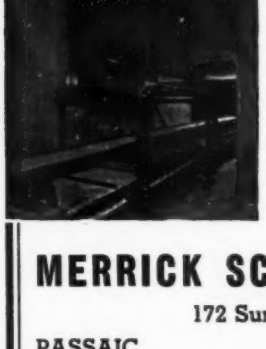

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New Mexico Convention At Carlsbad In January

The New Mexico Mining Association will hold its annual convention in Carlsbad, New Mexico on January 17 and 18. The famous "Suppliers Party" is scheduled for Thursday evening. A prominent New Mexico civic leader will speak at the opening luncheon and an international known mining engineer will be the featured speaker at the Banquet on the 19th and will be introduced by T. M. Cramer, association president.

Technical speakers will include Blair Burwell, President of the Minerals Engineering Company, who will discuss uranium. Other speakers will report on the economics of zinc milling, perlite, taxation, mining legislation, explosives, potash, and developments in mining and milling. A series of social events are planned for the ladies.

Anaconda To Develop Huge Nevada Project

The Defense Materials Procurement Agency has signed an agreement with Anaconda Copper Mining Company which will make possible the construction of plant facilities at Anaconda's low-grade oxide copper property near Yerington, Nevada at a cost of about $33,000,000. With definite plans already prepared, it is expected that development and construction will have been finished and operations ready to begin during the second half of 1953.

Mining will be by open-pit methods, and some preliminary stripping will be required in order to open up the oxide copper ore body which is estimated to contain about 35,000,000 tons of ore. The oxide ore body overlies a sulphide ore body, any eventual production from which would require a new treatment plant.

A beneficiation plant for the treatment of the oxide ore will be constructed and will handle 11,000 tons of oxide ore per day. The ore will be leached by sulphuric acid, and the copper precipitated on scrap iron for shipment to Anaconda's Montana plants for smelting and refining.

Because sulphur is in critical supply, Anaconda also plans to develop and mine a low-grade sulphur deposit, and to build a plant for the manufacture of sulphuric acid. The sulphur will come from the Leviathan mine in Alpine county, California, and will be trucked 60 miles to Yerington where it will be made into sulphuric acid.

The company will be assisted in the project by two government aids; first, a rapid five-year write-off of 75 percent of the amortizable portion of the investment; and second, a contract with the DMPA for the government to put a floor price of 25½ cents a pound on copper to be produced. This is the highest announced DMPA floor under copper.

DMPA has agreed to purchase, on tender, up to 128 000 tons of copper during the first six years of operation. Estimated life of the property is 10½ years. During the first two years of this six-year period, output is to be 30,000 short tons annually, and for the remaining years, 33,000 short tons annually.

American Smelting Gets DMPA Aid for Copper Mine

The American Smelting and Refining Company will spend $17,000,000 to expand its Silver Bill mine property in Pima county, Arizona. The Defense Materials Procurement Agency, acting for the Government, has agreed to buy 197,000,000 pounds of Silver Bell copper over a 5½-year period. If the company is unable to sell the copper privately, the Government will buy up to 177,000,000 pounds of the first 197,000,000 at 24½ cents a pound.

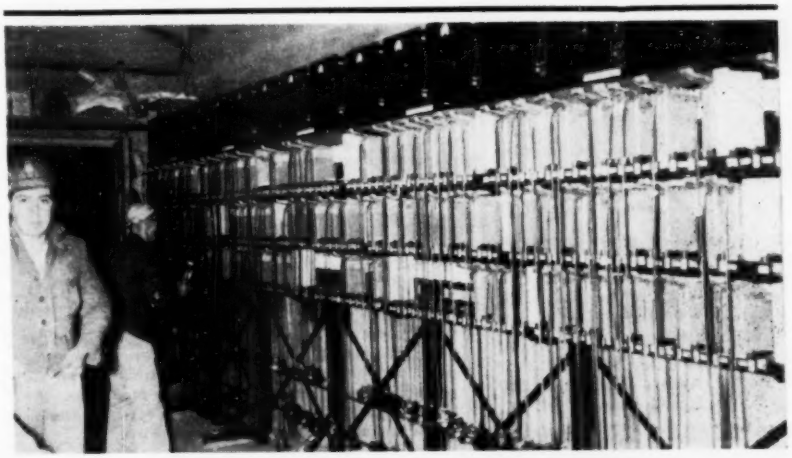
A 10,000-ton-per-day mill will be built to treat ore from an open pit to be developed on the low-grade ore body. Annual production is expected to be around 36,236,000 pounds and should get under way within two years.

ARIZONA

A newer and larger capacity production shaft is being sunk by the *Shattuck Denn Mining Corporation* at its *Iron King* mine at Humboldt, Yavapai county, Arizona. The shaft will be sunk at a new site and will be considerably deeper than the present shaft, or about 2,000 feet. A large mine hoist is on order. The Iron King is a zinc, lead, and copper property.

Mat Danenhauer, of Clifton, Arizona, and associates are mining a small tonnage of manganese ore from the *Black Rock* mine in the San Francisco Mining District, two miles north of Clifton. Production of high-grade ore—about two tons a day—is being stockpiled for later shipment to the government purchasing depot at Deming, New Mexico. Only ore running over 40 percent Mn is mined. The ore occurs as replacement of the limestone rock at the edge of a large fault and is covered by overburden to a depth of 25 to 35 feet. Along the wash, the ore is exposed and it is there that present mining operations are being conducted. Later, the owners hope to build a jigging plant to treat the lower grade ore running 20 to 40 percent. Mining will be done with scrapers and portable conveyors.

The *Lomalina Mineral Development Company*, Tombstone, Arizona, is leasing the *San Juan* mine in the Dragoon mining district, 16 miles northeast of Tombstone from Jonathan Gordon. Production, coming from old stopes left from previous operations, is scheduled to increase from the current 50 tons per day to 100 tons. The company also has started operations at the *Emerald* mine in the Tombstone mining district. A considerable tonnage of low-grade ore is said to have been left in the mine by former operators, and stoping operations have been possible immediately. A daily production of about 50 tons of lead, gold, and silver ore is expected. Ore from both mines will be milled at the company's own mill near Tombstone. The mill has a daily capacity of 100 tons and consists



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CALIFORNIA

Quicksilver operations have been resumed at *Rinconada* mine near Santa Margarita, California. Early in 1951 surface prospecting was started with a bulldozer, and the rotary furnace was reconditioned for mercury production. Mrs. Teresa Bell is owner of the property.

Sierra Copper Company has been granted a certificate of necessity by the *Defense Production Administration* to write off 60 percent of $27,000 on a $52,000 project at Copperopolis, California.

An old quicksilver mine on the slopes of Mt. Diablo in Contra Costa county, California, is being prepared for reactivation. The property has been leased from the *Mt. Diablo Quicksilver Company, Ltd.* by James Ronnie, Trustee. It was formerly leased by the *Bradley Mining Company*.

John A. Lansden is said to be planning to recover gold from placers on the Bear River near Auburn, California, by means of a dragline dredge and suction pumps. He is reported to have leased two properties on both sides of the river and to be negotiating with the Nevada Irrigation District for a lease on about 25 acres. Lansden is also said to be planning to recover quartz gravel for sale as flux.

Idaho-Maryland Mines Corporation reports that ore production did not increase during the last half of 1951. The use of light-weight drills somewhat alleviated a continuing shortage of miners. Considerable difficulty was experienced in pushing development of the newly located ore body and at the same time maintaining production. This situation is expected to improve and should be substantially overcome by March when the crosscut has been completed between the 2,700-foot winze and the Brunswick 3,280-foot level. Only two of the six ledges have been exposed so far by the 3,280 crosscut which has been turned off on the No. 1 vein to intersect the 2,700 winze. Diamond drilling toward the other ledges is in progress.

Several carloads of copper ore have been shipped from the *Star-Excelsior* mine since it was reactivated last March. The ore is mined from lenses developed by a tunnel which was driven toward a rhyolite outcrop. The *Trebor Corporation* owns the property which is located near Copperopolis, California.

The old *Tyson* mine at French Hill, Del Norte county, California, is reported to be producing chromite from lenses exposed in the floor of the hydraulic pit above the old mine workings. Prospecting by diamond drilling has revealed that the ore bodies occur as lenses in fractured and sheared serpentine. *J & W Mining Company* who purchased the property earlier this year, is using a hydraulic giant to strip the broken serpentine from the ore bodies. The ore is being trucked 75 miles to the government purchase depot at Grants Pass, Oregon.

Rich gold ore is said to have been discovered in the old *St. Louis* mine near

METAL AND MINERAL MARKETS

METALS

December 20, 1951

COPPER:	Electrolytic. Delivered F.o.b. cars, destination U.S.A.	24.50¢
	Lake. Delivered, destinations U.S.A.	24.625¢
	Foreign Copper. New York	27.50¢
LEAD:	Common Grade. New York	19.00¢
	Foreign lead. New York delivery. (Import price ceiling)	19.00¢
ZINC:	Prime Western. East St. Louis	19.50¢
	Foreign zinc. East St. Louis delivery. (Import price ceiling)	19.50¢
ALUMINUM:	Primary 30 pound Ingots (99% plus). F.o.b. shipping points	19.00¢
ANTIMONY:	Bradley Mining Co.'s Elk Brand 99.5%. F.o.b. Cascade, Idaho	50.00¢
	Lone Star Brand. F.o.b. Laredo, in bulk	50.50¢
BISMUTH:	(In ton lots) price per pound	$2.25
CADMIUM:	Sticks and bars. 1 to 5 ton lots	$2.55
COBALT:	97-99%, keg of 550 pounds	$2.40
MAGNESIUM:	Ingots (99.8%). F.o.b. Freeport, Texas	24.50¢
MERCURY:	Flasks. Large lots, New York	$220.00
NICKEL:	"F" Ingots (5 pounds). F.o.b. refinery, Port Colburne, Ontario	56.50¢
TIN:	Grade A Brands. New York	103.00¢
TITANIUM:	(98.5%). F.o.b. Beverly, Massachusetts	$7.00
GOLD:	United States Treasury price	$35.00 per ounce
SILVER:	Newly mined domestic. United States Treasury price	90⅓¢ per ounce
	Foreign. Handy & Harman	88.00¢ per ounce
PLATINUM:		$90.00-$93.00 per ounce

ORES AND CONCENTRATES

BERYLLIUM ORE:	10 to 12% BeO. F.o.b. mine, Colorado	$35.00 per unit
CHROME ORE:	F.o.b. railroad cars eastern seaports. Long tons dry weight.	
	African (Rhodesian). 48% Cr_2O_3.	
	3 to 1 chrome-iron ratio	$43.00-$44.00
	African (Transvaal). 48% Cr_2O_3.	$34.00-$35.00
	Turkish. 48% Cr_2O_3. 3 to 1 chrome-iron ratio	$52.00-$53.00
	U. S. Government ore purchase depot Grants Pass, Oregon, Base price, lumpy ore, $115.00; fines and concentrates $110.00 for 48% Cr_2O_3 and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr_2O_3 and a 2 to 1 ratio.	
IRON ORE:	Lake Superior. Per gross ton Lower Lake Ports.	
	Mesabi, Non Bessemer, 51.5% Fe	$ 8.30
	Mesabi, Bessemer, 51.5% Fe	$ 8.45
	Old Range, Non Bessemer	$ 8.55
	Old Range, Bessemer	$ 8.70
MANGANESE ORE:	Metallurgical grade. 46 to 48% Mn. Long ton unit	$1.10 to $1.18
	Chemical grade. 80% MnO_2. Per ton	$60.00
	Chemical grade, domestic, 70% MnO_2, F.o.b. mines	$45.00
	U. S. Government ore purchase depot Deming, New Mexico. Base price, $6.10 per long dry ton for 15% ore. Price increasing to $76.00 for 40% ore. Less $12.00 per long dry ton for milling. U. S. Government purchase depot Butte, Montana. Base price, $6.05 per long dry ton for 12% ore. Increasing to $40.42 for 30% ore. U. S. Government purchase depot Phillipsburg, Montana. Base price, $6.43 per long dry ton for 15% ore. Increasing to $34.81 for 30% ore. (Montana ore must contain not less than 90% as carbonate).	
MOLYBDENUM CONCENTRATE:	90% MoS_2. F.o.b. Climax, Colorado. Per pound of contained molybdenum, plus cost of containers	$1.00
TUNGSTEN CONCENTRATE:	60% WO_3. Per short ton unit	$65.00
URANIUM ORE:	Carnotite-Roscoelite. F.o.b. purchase depot plus $0.06 per ton mile (maximum of $6.00), Rifle, Naturita, Uravan and Durango, Colorado; Salt Lake City and Monticello, Utah. Base price for 0.10% ore is $1.50 per pound and ranges to $3.50 per pound of contained U_3O_8 plus $0.75 per pound for each pound in excess of four pounds per short dry ton and an extra allowance of $0.25 per pound for each pound in excess of 10 pounds. A development allowance of $0.50 per pound is paid for all ores purchased.	
VANADIUM ORE:	Carnotite-Roscoelite. V_2O_5 content, up to 10 pounds, in uranium ore paid for at $0.31 per pound in ratio of 10 parts V_2O_5 to 1 part U_3O_8.	

NON-METALLIC MINERALS

BENTONITE:	Minus-200-mesh. F.o.b. Wyoming points. Per ton in carload lots	$12.50
	Oil Well grade. Packed in 100 pound paper bags	$14.00
FLUORSPAR:	Metallurgical grade. 70% effective CaF_2 content per short ton F.o.b. Illinois-Kentucky mines	$43.00
	Ceramic grade. Minimum CaF_2 content, 95%	$45.00
	Acid grade. 97% CaF_2	$60.00
PERLITE:	Crude: F.o.b. mine per short ton	$3.00 to $5.00
	Plaster grades. Crushed and sized. F.o.b. plants per short ton	$7.00 to $9.00
	Concrete grades. Crushed and sized	$6.00 to $8.00
	Oil Well Grades.	$6.00 to $9.00
SULPHUR:	Long ton, F.o.b. Gulf Coast mines	$22.00

Quotations on metals and certain ores through the courtesy of *American Metal Market*, New York, N.Y.

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Nevada City, California, which was reopened last year by *Willow Valley Mines*. The new vein, said to vary in width from three to seven feet, was located at the end of a 435-foot drift, and may be an extension of the famous *Omega* ore body.

Prospecting on gold placer deposits near Carrville, California, has been discontinued by *Natomas Company*. The property was formerly controlled by *Carrville Dredging Company* which operated a bucket-line dredge in the area for several years.

Idle for 50 years, the *Daulton Copper Mine* near Madera, California is being reopened by E. B. Smith of Raymond, California. Leased from L. M. Bradford, the mine is being dewatered and reconditioned. Diamond drilling in 1946 is said to have located a sulphide deposit containing copper, lead, and zinc in virgin ground, and it is this orebody which will be developed. Dewatering expenses will be repaid in part by precipitating copper from mine water with scrap iron.

NEVADA

Nevada-Massachusetts Company is said to be milling 500 tons of scheelite daily at its property in Tungsten, Nevada, now that its mill has been enlarged. Mining is both open pit and underground. Open-pit operations are reported to have been materially expanded by the efficiency of heavy machinery. Underground deposits have been developed to a depth of about the 1,000 feet. About 190 men are employed.

The *War Eagle* mill at Manhattan, Nevada, is being remodeled to treat custom gold and gold-silver ores. The improved plant is to be ready for operation next summer and will be equipped with a leaching process suitable only for treatment of low-grade ores in the area.

Pioche Manganese Company, a subsidiary of *Combined Metals Reduction Company*, has awarded a contract to *Standard Steel Corporation* of Los Angeles for the construction of a large rotary kiln. To be erected at Pioche, Nevada, the kiln will be 175 feet long and 9 feet in diameter. It will be used to process manganese dioxide ore. Standard Steel will supply the complete sintering unit, including a cooler which takes ore at temperatures in excess of 2000° F and cools it to temperatures suitable for handling.

The *Minnesota Copper* property near Yerington, Nevada, is being prepared to produce high-grade iron ore, according to Russell T. Miller. The exploration work was done by *New World Exploration, Research, and Development Corporation* of Reno, Nevada, and consisted of geological surveys, magnetometer surveys, and drilling of the favorable areas to block out a good tonnage of ore. Sydney M. Berry has the property under lease from Mrs. E. Jesson of Hawthorne, Nevada.

A new mineral called robinsite has been announced by the U.S. Geological Survey. The bluish-gray metallic looking mineral was found in the *Red Bird* mine in Pershing county, Nevada in 1943, by Edgar H. Bailey of the geological survey while investigating mercury deposits. A sample sent to Washington failed to match any already found so the sample was forwarded to Dr. S. C. Robinson of Queens University, Kingston, Ontario, Canada in 1947. His work makes possible the identification as something new and the mineral has been named in his honor.

A mill is to be erected at the *Noonday* mine on Battle Creek in Ruby Valley, Nevada. Six men are reported to be working on the property which is part of the Friday group discovered in 1910. The property will produce lead, silver, and zinc concentrates for shipment to Utah smelters. Jack White is the operator, and Fred Crosby is mine superintendent.

An unusual mining operation is reportedly being conducted by L. B. Smith and Dan Avery at Carson River, six miles east of Carson City, Nevada. With a 100-yard-per-hour Bodinson dry-bank washing plant, jig-equipped, and a 2 yard Lorain dragline, the firm is said to be recovering high values in gold, silver, and quicksilver, from tailings of the early Carson River mills. They are working 12 dumps along a 14-mile stretch. The unusual feature is that quicksilver used by the old mills evidentally spilled over into the tailings and accumulated in pockets or concentrations in the dumps. One shovel full of earth is reported to have recovered 18 pounds of mercury.

A mile of graded road work has been completed at Ophir Canyon, Nevada, for *Newmont Mining Company* in order to develop a tungsten property in that area. As soon as mining machinery can be moved onto the property, a develop-

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ment-prospect program to determine the extent of the deposit will get under way.

Lead King Mines, Inc. expects to start production soon at its mine 16 miles north of Las Vegas, Nevada. A 30-foot headframe and hoist have been installed and the company expects to start stockpiling ore until a beneficiation plant is constructed. A main shaft has been sunk to the 200-foot level with a sub-surface level of 30 feet. An ore shoot extending over 50 feet is said to have been exposed, in addition to several drifts and tunnels leading from the main shaft. The corporation was formed in May 1951 with incorporators and officers listed as James H. McCarthy, Richard L. Neville, and Herschell G. Conley.

The *Argentite* and *Nivloc* silver-gold properties at Silver Peak, Nevada, have been reactivated and the Black Mammoth mill has been rebuilt. Avery Brundage of Chicago and E. R. Hines of Tonopah, Nevada, have acquired control of the properties. Development work is being conducted on the 400- and 500-foot levels of the Argentite, while the Nivloc shaft has been retimbered to the 800-foot level.

The *Jumbo* mine, operated by *Austin-Jumbo Mines, Inc.*, in the Awakening district of Nevada, is one of Nevada's largest gold producers. About $500,000 has reportedly been spent on mining and milling equipment for the mine during the past two years. The enlarged mill now treats 1,000 tons of ore daily, recovering about 85 percent of values by amalgamation.

Combined Metals Reduction Company has installed a huge electric furnace in the refinery building it has leased at the *Basic Magnesium* plant in Henderson, Nevada. A special operating company, *Pioche Manganese Company*, has been set up by Combined Metals to handle manganese ores from the Pioche mines and mill. R. W. Lottridge is general manager.

A group of lead-silver properties in the Gold Run district 30 miles southwest of Winnemucca, Nevada, has been purchased by Mrs. E. B. Lowman of Winnemucca. Improvements are being made under the direction of S. E. Davis, mine superintendent. Mrs. Lowman reports that *Eagle-Picher Mining and Smelting Company* is considering leasing the property and building a concentration plant. *J. R. Simplot Company* of Boise, Idaho, is also said to be interested.

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NEW MEXICO

The *Anaconda Copper Company* has been given permission to explore the 410,000-acre Laguna Indian reservation between Albuquerque, and Grants, New Mexico for uranium. Meanwhile, Anaconda has registered with the New Mexico Mine Inspector to mine in both Valencia and McKinley counties, in the Grants area. There are also unconfirmed reports that Anaconda has applied to the *U.S. Atomic Energy Commission* to build a uranium mill at Grants which would be used by Anaconda and the *Santa Fe Railway*. Should Anaconda find sufficient ore on the Laguna lands to warrant development, the company will have the first chance to arrange mining leases with the tribe. Laguna Indians found ore on the reservation several months ago and speculation has linked the find with the big Santa Fe development at Grants, farther to the west. Terms of the exploration agreement stipulate that the Lagunas will receive 10 percent royalty on ores valued at $10 per ton or less at the Anaconda mill site. For each additional $10 per ton valuation, the Indians will receive one percent royalty up to a maximum of 20 percent on ores valued at $110 per ton. Mill operations would be under the supervision of the U.S. Geological Survey which would make frequent tests. The agreement also calls for preferential rights extended to the Indians for whatever jobs they could qualify for to fill in the mining operations at the prevailing wage rate for civil service in the community. Anaconda receives an exclusive permit for the first year. At the end of that time, the permit area is to be reduced to one-fourth the amount of the original acreage selected by the company. If the company wishes to retain the permit for the second year, it must have expended not less than $25,000 for exploratory work during the first year. If the company wishes to retain the permit for a third year, it must have expended a total of $75,000 during the first two years. The preferential lease stipulation extends for as long as the permit is in force. Although the company is allowed to select acreage, operations are not permitted on agricultural lands or near dwellings, windmills, storage reservoirs, and similar installations.

The name of the *New Mexico Miners & Prospectors Association* has been changed to the *New Mexico Mining Association*. The Association also has a new office at 310 South 3rd Street, Albuquerque, New Mexico. Dwight H. Plackard, executive secretary made the announcement and said that the Association's official publication will now be known as the "New Mexico Miner." Mail addressed to the Association should be directed to P. O. Box 503.

The shaft-sinking operation of the *Duval Sulphur and Potash Company* has reached the potash-bearing horizon at 1,430 feet. The *Utah Construction Company*, shaft contractor, has completed cutting stations. The two shafts of the *Southwest Potash Corporation*, in the same area near Carlsbad, New Mexico, were last reported to be down 600 feet.

The firm of *Chapman and Wood* has moved from its office at 310 South Third Street, Albuquerque, New Mexico, to the company laboratory at 536 North Jefferson, Albuquerque.

The Silver City, New Mexico, chamber of commerce has set up a committee to investigate the possibility of opening a small custom mill adjacent to the city. Minor improvement of a small abandoned mill nearby may allow it to serve small miners in the area. The move would be to increase Silver City's industrial potential.

The *United States Smelting, Refining, and Mining Company* has filed an application for patent to mining claims covering a 200-acre group of 10 lode mining claims in the Pinos Altos district, New Mexico. The property was acquired about two years ago by the firm which also optioned numerous other mining claims in the district for future exploration and development as copper, zinc, and lead producers. The area was once New Mexico's largest gold and silver producer but these would only be by-products now. Claim holders in the area are reported to have been very active lately, with regular shipments of ore to the *American Smelting and Refining Company* smelter in El Paso, Texas.

Santa Fe Lead-Zinc Mines, Inc. is reopening its *Black Hornet* and *Bottom Dollar* mines in the Cerillos mining district, New Mexico. The firm's *Tom Payne* and *Pennsylvania* mines are already in operation in the district. Expansion is planned for the Pennsylvania operation to include the *J. B. Weaver* claim, the *Whalen* group, the *Little Joe*, and the *Ingersoll* sites. A 25-ton mill is in operation and a 100-ton mill is being built.

The government's manganese ore purchasing depot is in operation at Deming, New Mexico, with funds available to buy up to 6,000,000 contained long dry ton

units. The depot is on an 82.7-acre site held by the *Reconstruction Finance Corporation*. It was operated under the direction of the *Metals Reserve Company*, an agent of the RFC during World War II when some 70,000 tons of manganese ore was purchased. The *General Services Administration* says that more than 300 manganese producers have been awarded certificates to sell at Deming.

The *Anaconda Copper Mining Company*, at its potential mill site near Grants, New Mexico, is drilling a 12-inch diameter well to the depth of 400 feet as a possible source of water. At a depth of 250 feet, a strong inflow of water was reported encountered.

F. A. Sitton, of Dove Creek, Colorado, has acquired a large group of uranium claims in the Grants district, New Mexico. Many of the claims cover outcrops of ore in the Morrison formation. Sitton is a large independent uranium producer with active mining operations in Colorado, Utah, and Arizona.

Perlite deposits in the Jemez Mountains north of Albuquerque, New Mexico, are being mapped and evaluated. Owned by John A. Wood, E. P. Chapman Jr., and Robert E. Anderson Jr., the deposits were discovered about a year and a half ago. Development work began shortly afterward. A spokesman said the deposits appear to be extensive, containing both glassy and pumacious types of material. He added that the high-grade deposits seem to have a remarkably uniform quality.

Northwest Convention

Continued from Page 49

Unique In Mining History

John Edgar, general superintendent, gave a report on "Sunshine Area Operations." Sunshine is conducting a unique operation in mining history by mining in seven different areas for seven different mines with seven different operating agreements as to participating ownerships. An entirely successful system has been worked out despite the problems of mining varying grades and types of ore from the widely separated mine workings.

DMEA Exploration Program

A. E. Weissenborn of the United States Geologic Survey and M. E. Volin of the U. S. Bureau of Mines who form the officers of the Region II field exploration team of the Defense Minerals Exploration Administration reported on the status of the 292 applications for exploration contracts filed with the Spokane, Washington office. They reported that 25 contracts were in force in Idaho calling for expenditures of $1,846,000, 21 in Montana with expenditures amounting to $705,800, and 11 in Washington to cost $383,300. The projects were for lead, zinc, tungsten, copper, antimony, uranium, manganese, fluorspar, monazite and thorium.

Stephens Reelected President

Trustees of the association reelected E. C. Stephens of Spokane as president. "Red" is geologist for the Anaconda Copper Mining Company. David E. Watson, Spokane, Thomas Consolidated Mines, Inc.; and Joseph C. Kieffer, Wallace, Idaho, Spokane Idaho Mining Company, were elected vice presidents. The treasurer for 1952 will be E. K. Barnes of Spokane. He was reelected. Newly elected trustees are Karl W. Jasper, Spokane, Grandview Mines, Inc.; P. Evan Oscarson, Spokane, Mines Management Inc.; Henry L. Day, Wallace, Day Mines, Inc.; and C. A. R. Lambly, Metaline Falls, Washington, Pend Oreille Mines and Metals Company.

THE MARKET PLACE

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ELECTRICAL, INDUSTRIAL and CONSTRUCTION EQUIPMENT

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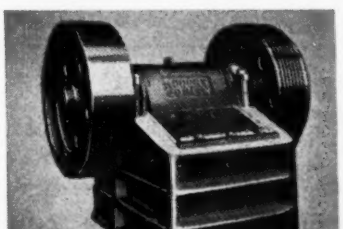
2—8"x12" Universal #2M.
1—9"x12" Cedar Rapids.
1—8"x24" Rogers, cast steel
1—8"x36" Universal, all steel
1—15"x28" Pacific, all steel
1—9"x15" Farrell Blake
1—9"x36" Cedar Rapids
1—13"x24" Telsmith

CONCENTRATING TABLES
2—Wilfley #6 left hand.
11—Deister "Plat-O" right hand.
42—Deister "Plat-O" left hand.

LOCOMOTIVES
1—2½-3½ ton Mancha "Titan A" battery locomotive 24" ga. with 2 sets of Edison batteries, battery charging set and battery transfer rack.
1—1½-ton Mancha type b "Little Trammer," 24" gauge
1—2½-ton Whitcomb Battery Locomotive, 24" gauge
2—7-ton General Electric Battery Locomotives, 36" gauge
2—8-ton General Electric Battery Locomotives, 36" gauge
4—10-ton Atlas Battery Locomotives, 36" gauge
1—3-ton Ruth Gasoline Locomotive, 18" gauge
1—3-ton Whitcomb Gasoline Locomotive, 24" gauge
1—6-ton Goodman Trolley Locomotive

ELECTRIC HOISTS
1—10 HP Box single drum.
1—#0 Vulcan single drum.
1—15 HP Morse single drum.
1—Vulcan 2000# single drum.
1—Vulcan 3000# single drum.
1—20 HP H&B, single drum.



1—#1½ Vulcan single drum.
1—# 22-C Vulcan single drum.
1—McFarlane 3000# single drum.
1—40/60 HP H&B, single drum.
2—#4½ Vulcan single drum.
1—50 HP Fairbanks-Morse single drum.
1—#23 ELF Vulcan single drum.
1—60 HP H & B, single drum
1—Vulcan 7000# — single drum hoist.
1—150 HP single drum.
1—150 HP Vulcan single drum.
1—80 HP Lidgerwood triple tandem drum.
1—80 HP Thomas triple tandem drum.
1—40 HP 3 drum American steam hoist.
1—150 HP double drum Denver Engineering works hoist with slipring motor and controls.

BALL & ROD MILLS
1—4'x4' Standard ball mill.
1—8'x22" Hardinge pebble mill.
2—3'x8" Marcy rod mills.

PUMPS
1—17 stage Pomona deep well pump with 50 HP motor, 360' head.
1—4" Dorr duplex diaphragm pump.
2—1" New Pacific centrifugal motor pumps.
1—1½" Ingersoll-Rand motor pump.
1—2" Duriron centrifugal pump.
3—3" Worthington centrifugal pumps.
5—5" Ingersoll-Rand motor pumps.
1—2" Ingersoll-Rand 2 stage motor pump.
4—2½" Pennsylvania 4 stage pumps.
4—3" United 6 stage pumps.
1—5" Manistee 8 stage pump.
1—2" Ingersoll-Rand vertical sinking motor pump.
2—5" Byron-Jackson portable pumps driven by Buda gas engines.
1—3" Allen-Sherman-Hoff rubber lined "Hydro-seal" sand pump.
2—2⅜"x4" Goulds simplex power pump.
1—4½"x10" Gardner-Denver horizontal duplex power pump.
1—2½"x6" Goulds vertical triplex pump.
1—7"x8" Goulds triplex pump.
1—10" & 6"x13" Cameron steam pump.
2—#35 Ingersoll-Rand air sump pumps.

BLOWERS
1—#8H 42 Jeffrey "Airodyne" mine fan.
1—Coppus-Vano blower size 250 type SM.
1—Coppus Ventair blower size 4 type T.
5—Type HS American blowers, 12000 CFM, derect driven by 12½ HP motors.
1—#5 Spenser Turbo blower with 3 HP motor.
1—#250 D.F.C. furnace blower.

MISCELLANEOUS EQUIPMENT
1—27"x14" McFarlance crushing rolls.
1—3' Symons cone crusher.
1—48"x18' Akins sprial classifier.
1—18"x18" McNally-Pittsburg coal crusher.
1—#50 Ingersoll-Rand drill sharpener.
1—18"x20' pan feeder.

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1—150 KW WEST. Syn. 275 V. 1200 RPM
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1—25 T G. E. 500/250 V. HM-824-A 44-36" Ga.
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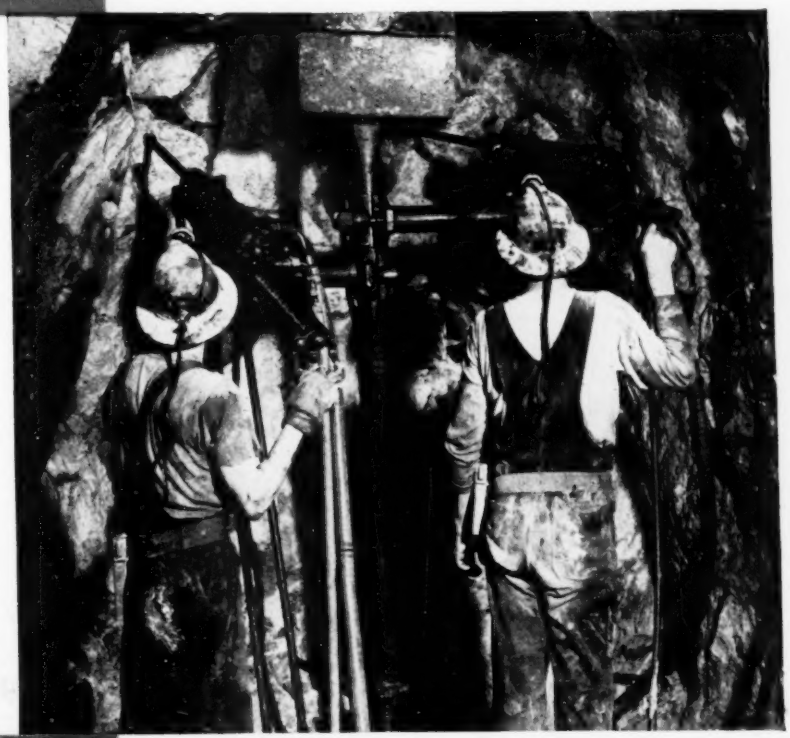

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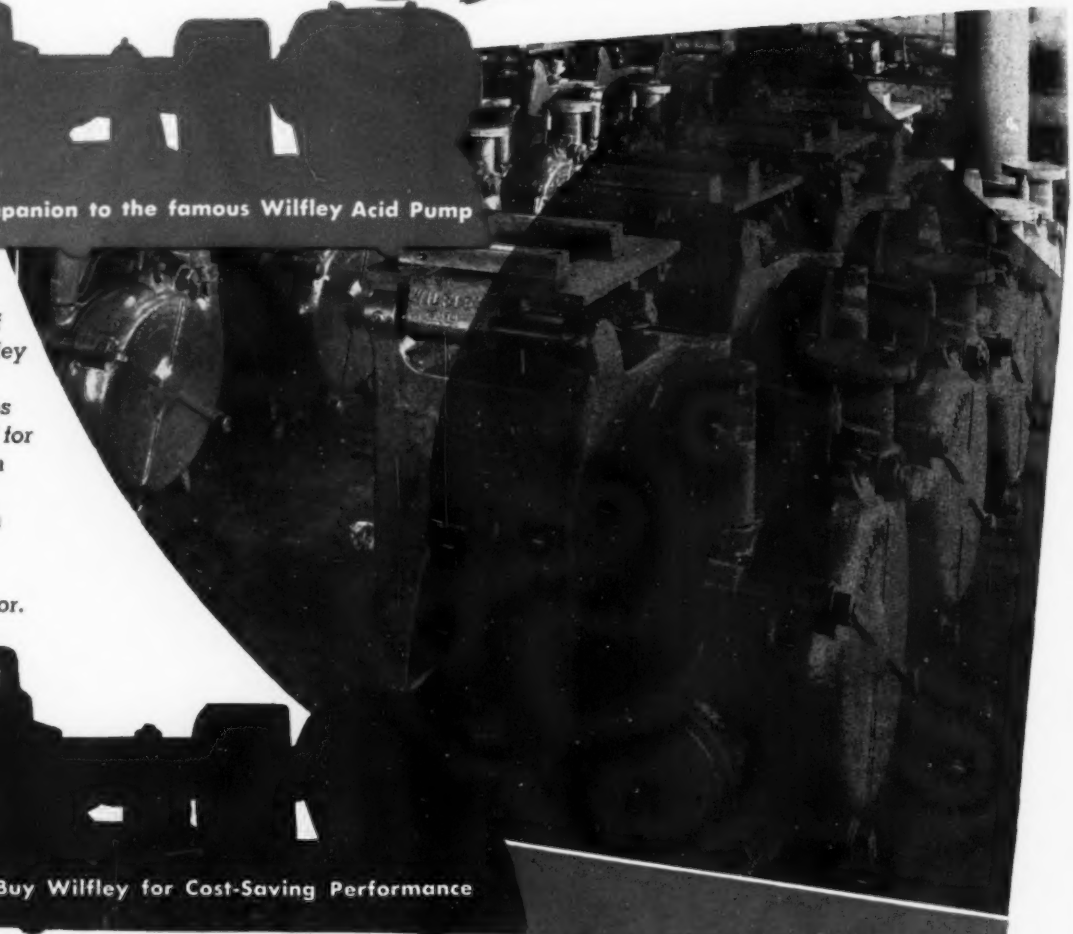


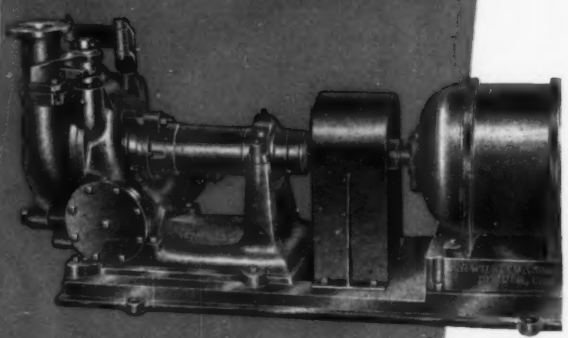
Part of a shipment of 5-inch Wilfley Model "K" Sand Pumps engineered for the flotation circuit of a large South American Copper Concentrator.

Buy Wilfley for Cost-Saving Performance

The new Model "K" Wilfley Sand Pump has won the approval of engineers throughout the world because of its dependable, trouble-free performance. Important improvements embodied in the Model "K" produce higher efficiencies, lower operating costs, worthwhile power savings, and stepped up production. Easy interchangeability of wear parts. Low maintenance costs. Individual engineering on every application.

Catalog 200 shows sizes, construction and application of Wilfley Model "K" Sand Pumps.

Write or wire for your copy today.



Patented

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